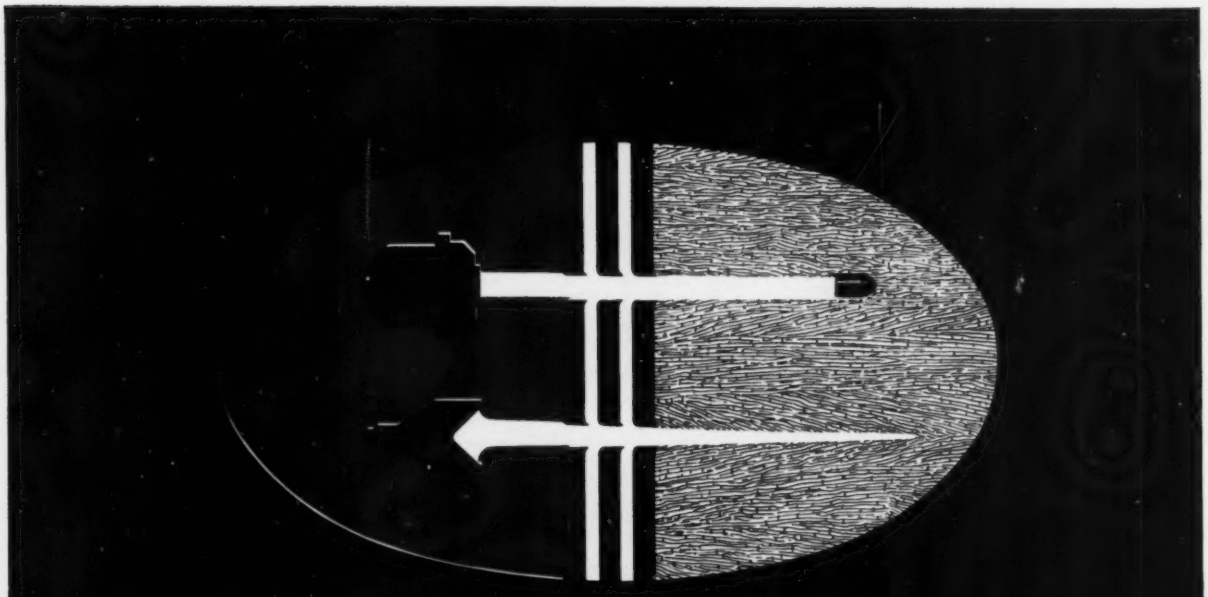

BETTER PERFORATING

TWO WORDS and a SYMBOL Sum up LANE-WELLS Service

That, in the shortest possible form, expresses the opinion of many successful operators in every oil area in the nation. And their opinion is based on many things—on Lane-Wells reliable service, which gets to the job at the promised time—on Lane-Wells experience and thorough knowledge of local conditions—on Lane-Wells accurate depth measurements, acknowledged to be the standard of the industry—and on Lane-Wells complete equipment, which can give bullet perforating or shaped-charge perforating as the job requires.

And many operators are finding that Lane-Wells combination perforating—bullet and shaped-charge on the same job—is getting results where nothing else will work.

Operators can tell you the "plus values" in Lane-Wells perforating

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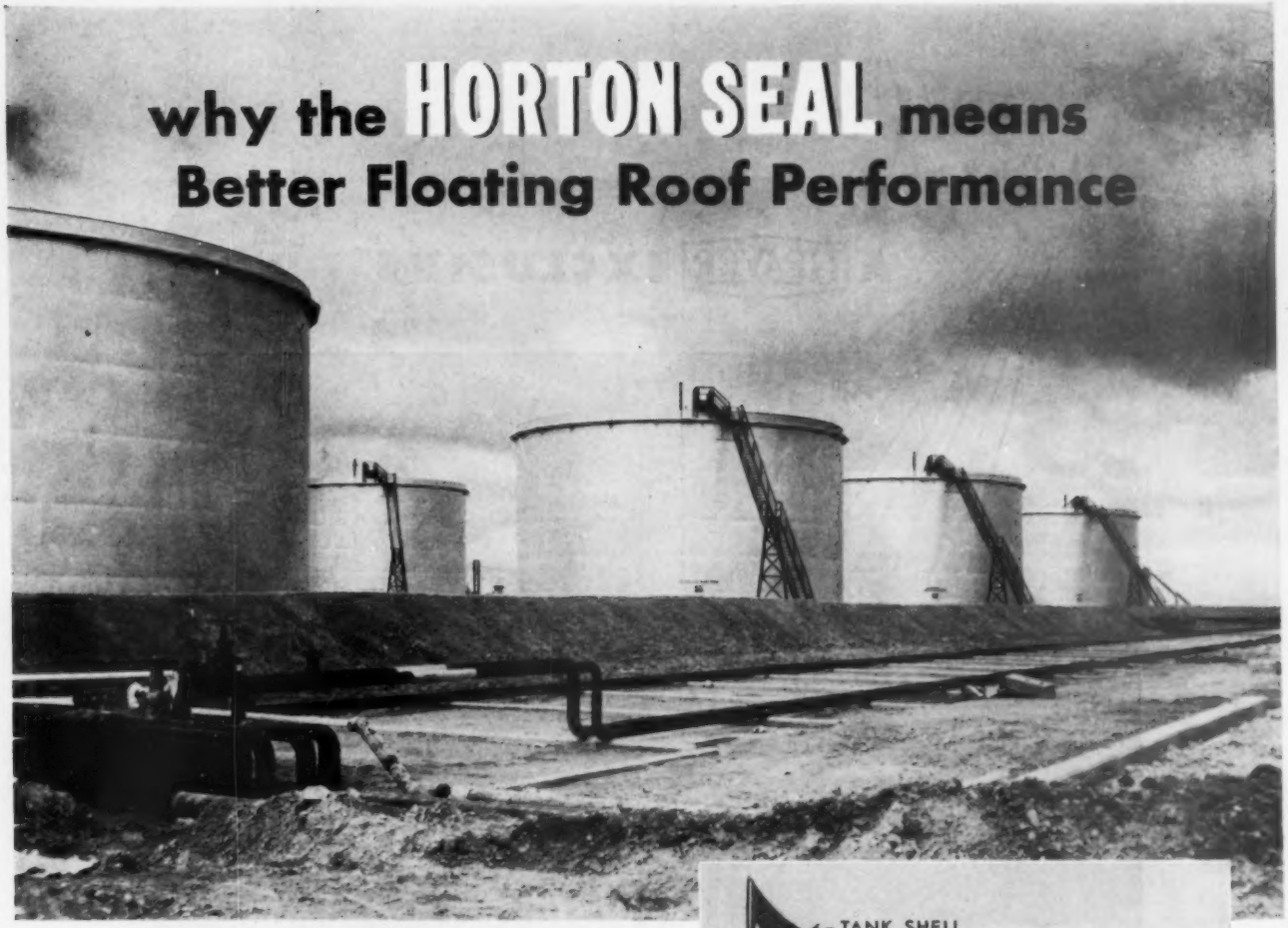
AG502

why the HORTON SEAL means Better Floating Roof Performance

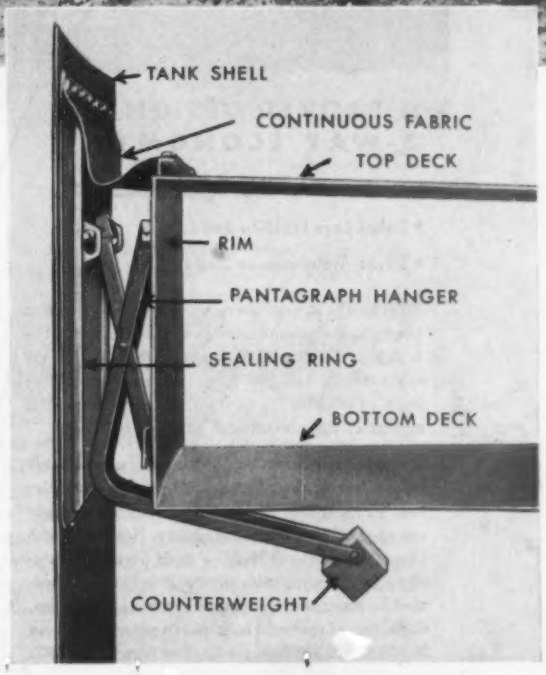


Above: Tanks equipped with Horton Double-Deck Floating Roofs at a large South American refinery.

More efficient petroleum storage facilities—tanks that reduce both filling and emptying and standing storage evaporation losses—demand *superior* methods and equipment. That's why the Horton Floating Roof has proved so successful in thousands of installations.

The secret of this better performance is the improved Horton Seal that so efficiently closes the space between the deck of the Horton Floating Roof and the shell of the tank in which the roof is installed. Three special Horton features help insure its positive operation. They are: (1) The continuous sealing ring with vertical flexures every 22 inches of circumference. Use of flexures allows the ring to expand or contract as necessary to form a snug fit with the shell at all times. (2) The pantagraph hangers that hold the sealing ring against the tank shell. These hangers apply an even, outward pressure on the ring at each flexure to insure good contact. The design and counterweighting of the pantagraph hangers keep the floating roof centered at all times. (3) The gastight, weatherproof, flexible fabric that closes the space between the deck of the roof and the top of the sealing ring making the space in the seal vaportight.

The Horton Seal is standard construction on all three types of Horton Floating Roofs—Pan—Pontoon—and Double Deck. Write our nearest office for more complete details.



Right: This cutaway view clearly shows the construction of the seal used on Horton Floating Roofs.

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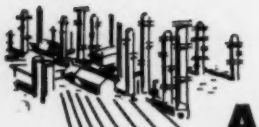


A GRAVER EXCLUSIVE

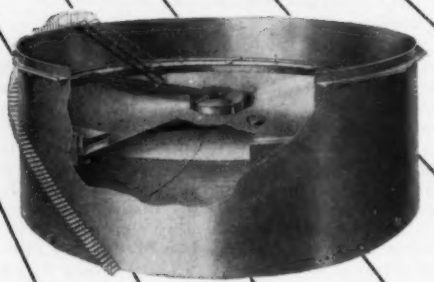
GRAVER CENTER-WEIGHTED FLOATING ROOF TANK

A PROVED DESIGN FOR 3-WAY ECONOMY

- No Corrosion — No Filling Losses
- Takes Less Steel To Build
- Saves Maintenance Costs

Built for the storage of crudes or finished petroleum products, the patented design of the Graver Center-Weighted Floating Roof combines the stability, the vapor-savings and the corrosion resistance of the Double Deck Floating Roof with the more economical aspects of the conventional pan-type roof.

Announced in November, 1950, after several years on the drawing board and a full year of exhaustive tests . . . this new design already has been widely accepted by the petroleum industry. New tanks with Graver's single deck floating roofs have been completed in six states with similar installations scheduled for nine more, covering all sections of the nation. Capacities of the tanks built and on order range from 20,000 to 150,000 bbls.; diameters from 60' to 150'.



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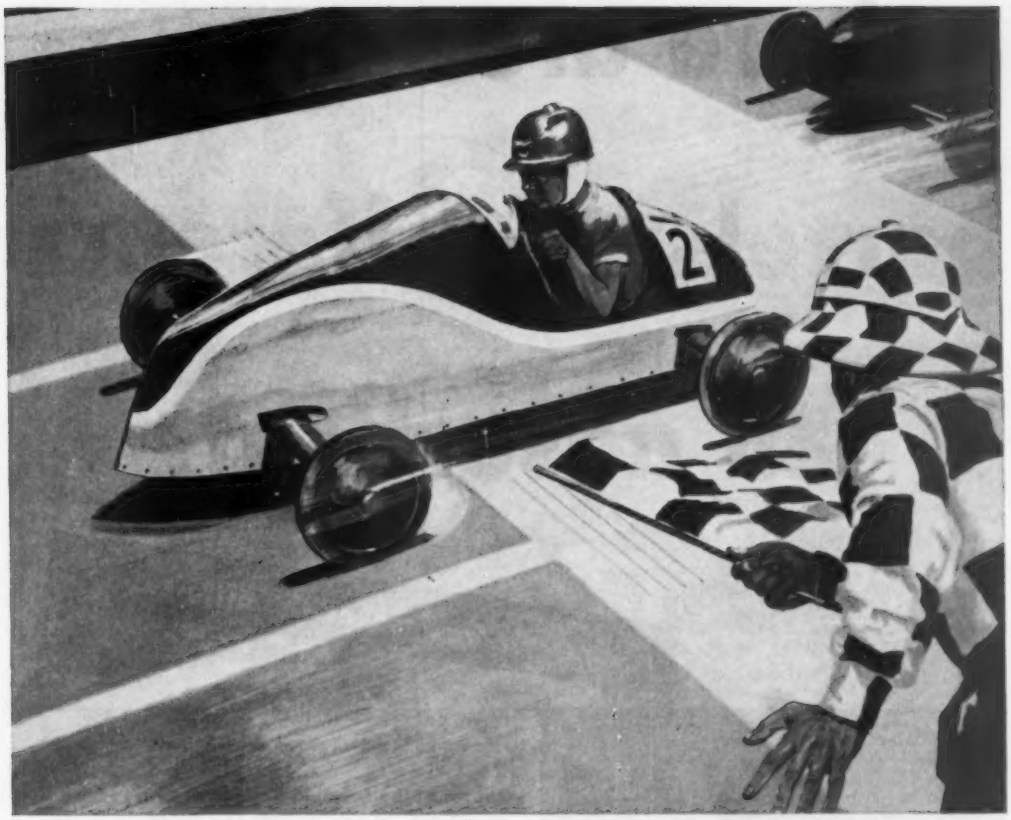


Coasting is fine for him—but not for us

A good friend of ours asked us not so long ago, "Why does Ethyl keep up all this activity—research, advertising, educational shows, exhibits, customer services of all kinds? Why not just make your product and sell it?"

The answer is simple. The petroleum industry is a progressive, uphill business and a very competitive one.

That industry buys "Ethyl" antiknock compound from us and adds it to their gasoline. Furthermore, they change and improve their gasoline from year to year. To be prepared for those future changes—and to be sure that refiners get the most from every cc of "Ethyl" antiknock compound—we must be continually exploring ahead.

At the same time, engines, lubricating oils and operating conditions are changing—so we try to be ready with the answers to the various technical problems that arise.

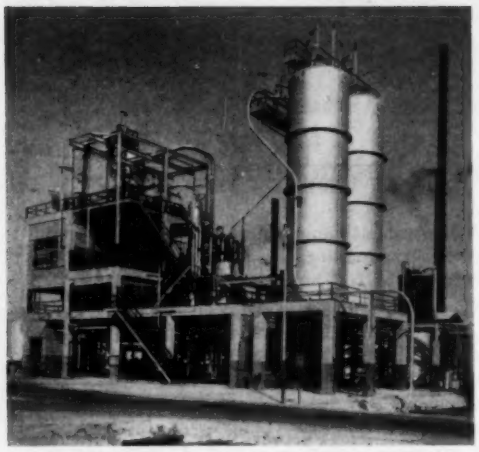
And since gasoline containing "Ethyl" fluid must ultimately be sold to consumers, we aim to keep out in front with up-to-the-minute merchandising and advertising help for our customers in all parts of the country.

We regard ourselves as part of the petroleum business, and that makes us part of your business. The petroleum industry has never coasted. It has always pushed on to greater and greater accomplishments. And you can be sure that Ethyl people will always be ready and anxious to do their share of the pushing.

ETHYL CORPORATION . . . New York 17, New York

there are barrels of difference in adsorbents

and *Filtrol* makes the difference



Shell's Contact Filtration Plant at Cardon Refinery, Venezuela

Refineries everywhere specify Filtrol adsorbents to refine more barrels of premium oils at lower cost.

Reasons Why Leading Refineries Everywhere Use Filtrol Adsorbents For Maximum Throughput . . .

1. **Press cake losses are reduced.**
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3. **Highest yields of finished oils.**

The technical service of Filtrol petroleum engineers and laboratories is at the disposal of refiners to assist them in product improvement, to decrease operating costs and increase production. Samples of Filtrol adsorbents and quotations submitted upon request.

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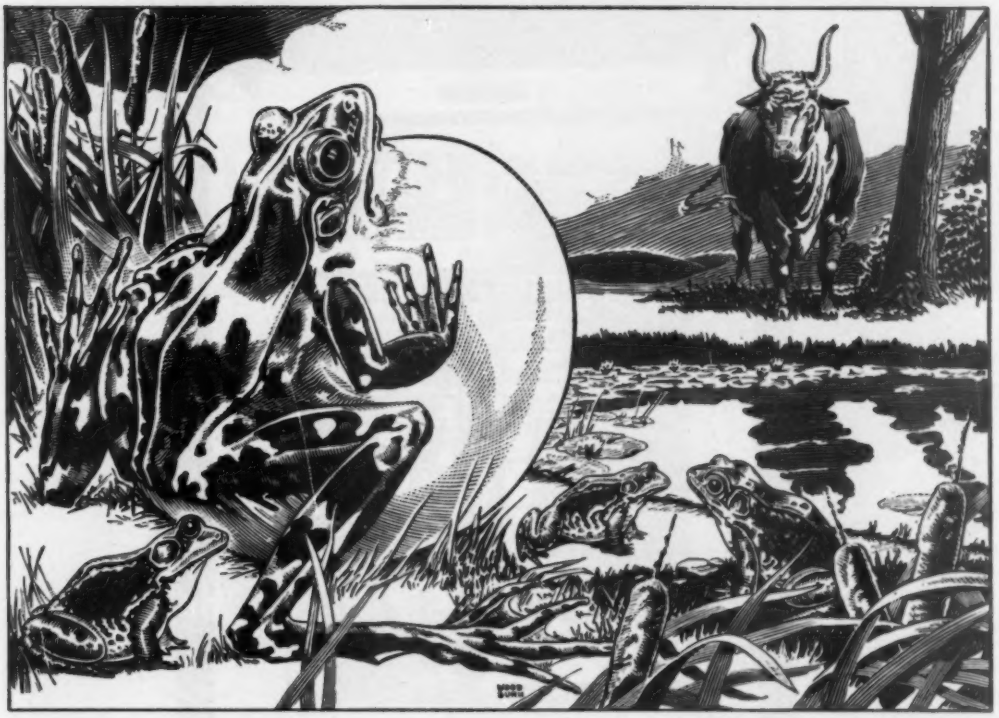

"It's foolish to try to be bigger than you are"

REMEMBER Aesop's fable of the frog and the ox? Told 2,500 years ago, it goes:

"Three young frogs cried to their mother that a little brother had been trampled by the largest beast in the swamp. 'Oh, no,' said the mother, 'no beast is larger than I.' And she blew herself up to show how big she really was. 'But it was much bigger,' the little ones chorused. Whereupon the vain mother inflated herself until she burst." And the moral was, "It's foolish to try to be bigger than you are."

Aside from the wisdom of the fable for each of us individually, there is solemn warning for us as a nation. Some among us seem to believe that with an unlimited supply of taxpayers' dollars America can buy anything--ease and security at home, acceptance of our ideas abroad, friendship of other peoples, even world peace.

Like the vain frog, America inflates herself more and more dangerously, trying to stretch herself to be the biggest thing in the swamp. Meanwhile the enormous beast that is the world goes its own way, scarcely affected by the vainglorious display of America's inflation. It's the same old world that was indifferent before the pomp of Egypt, Persia, Greece and Rome.

How will our present "puffing" end? Isn't it obvious that continued inflation can bring disaster? Only by a realistic policy of living within our means--not trying to be bigger than we are--can America avoid the catastrophe of Aesop's foolish frog.

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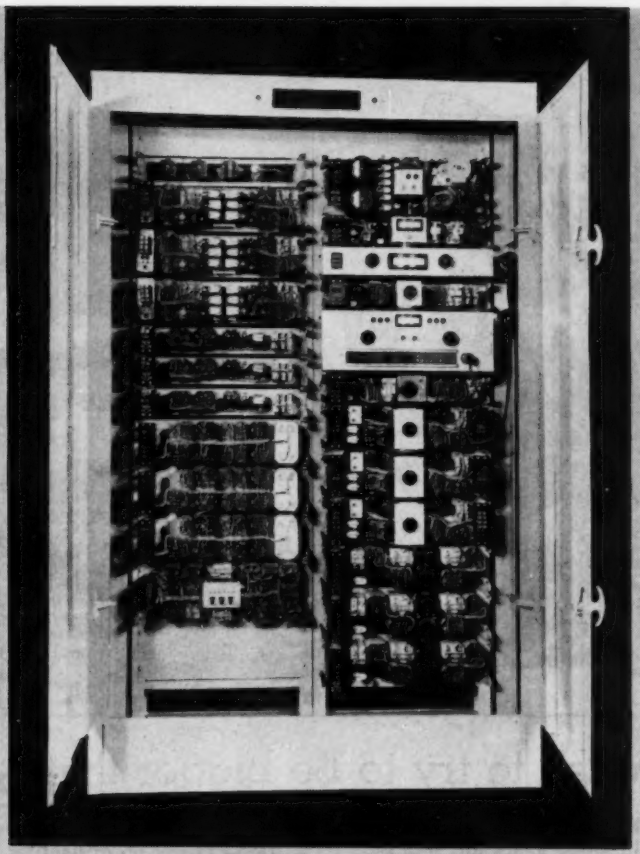

CABINET MOUNTED CARRIER TELEPHONE EQUIPMENT

This 3-Channel Carrier Telephone system on two short racks is assembled in a steel cabinet with lockable doors.
It is proving extremely useful for installation in buildings with low ceiling heights and the doors provide some security against wilful tampering. The equipment is complete with power supplies, testing equipment and alarm facilities.

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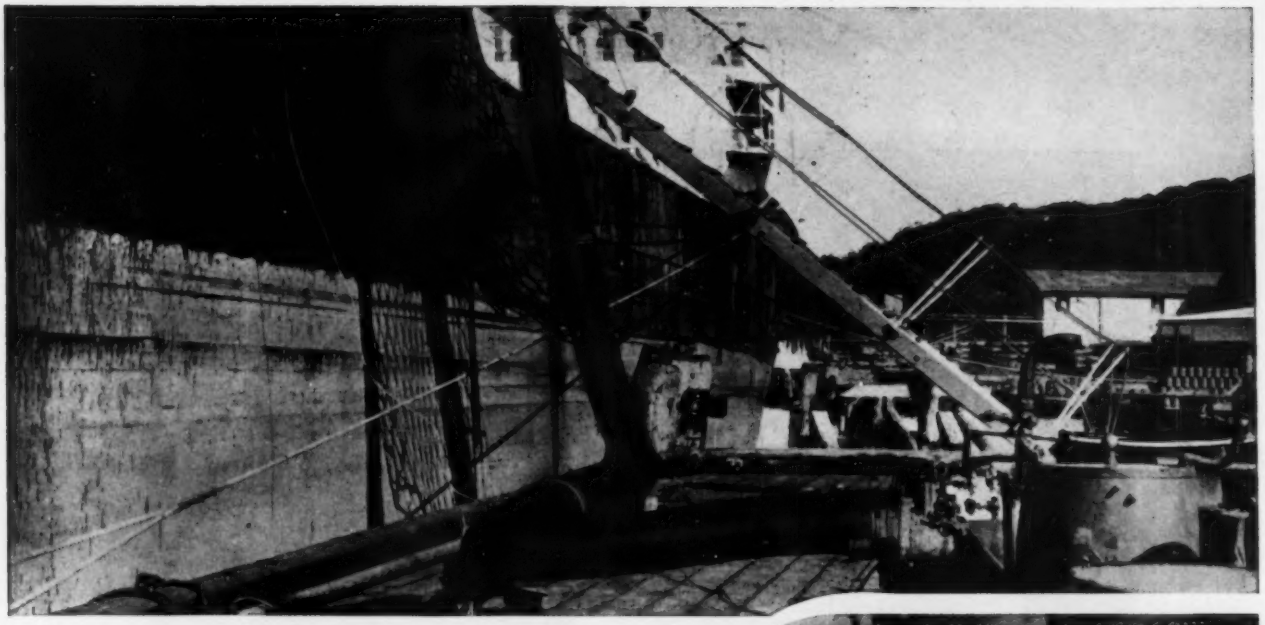
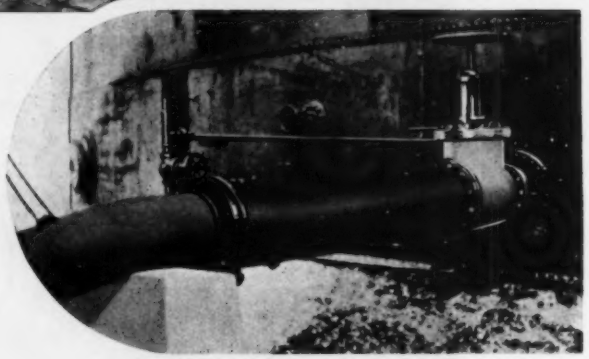


Dunlop clipless-type sea-loading hose discharging crude oil in Australia. Hose of this type, which incorporates high-quality, hard-wearing, oil-resistant synthetic rubber compounds, is capable of handling many tons of liquid per hour. Built of strong fabrics and internal wire reinforcements, it has a long and efficient service life.

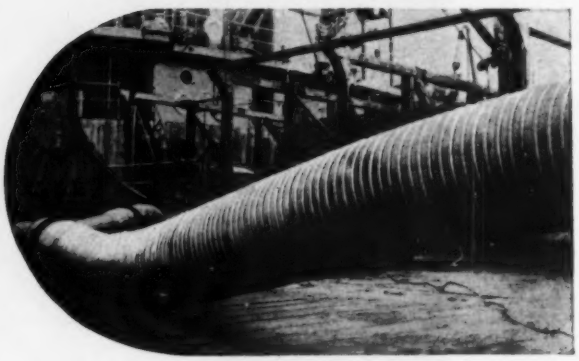


Dunlop clipless-type oil suction and discharge hose bridging the gap between a pipe line and a storage tank in Holland.

. . . Service that starts <u>before</u> you specify . . .

Dunlop, makers of the world's finest Industrial Rubber Goods, put service first. This means that the resources and talent of the Company's Technical Service are at your command from the moment you first consider new or replacement equipment. Drawing upon a vast store of knowledge of the application of rubber to the solution of complex industrial problems, the specialists staffing this world-wide service study and overcome each individual difficulty. They then guide you to correct choice of equipment, and advise you upon every aspect of its installation, operation and maintainence.

If you have a problem that may involve any of the products listed below or pictured above — which have been developed by Dunlop from an intimate knowledge of the conditions of use—get in touch with your nearest Dunlop representative or distributor. Or, if you prefer, send your enquiry direct to the address at the foot of this announcement.



Large bore, externally wire-armoured suction and discharge hose of an alternative variety operating in New Zealand. This type of hose is being largely superseded by the smooth cover, wire-embedded variety of hose illustrated above.

DUNLOP
A WORLD WIDE SERVICE TO THE OIL INDUSTRY

OIL SUCTION & DISCHARGE HOSE. SLUSH PUMP HOSE.
INDUSTRIAL HOSES for a wide range of uses in the Oil Industry such as welding, and pneumatic tool use.
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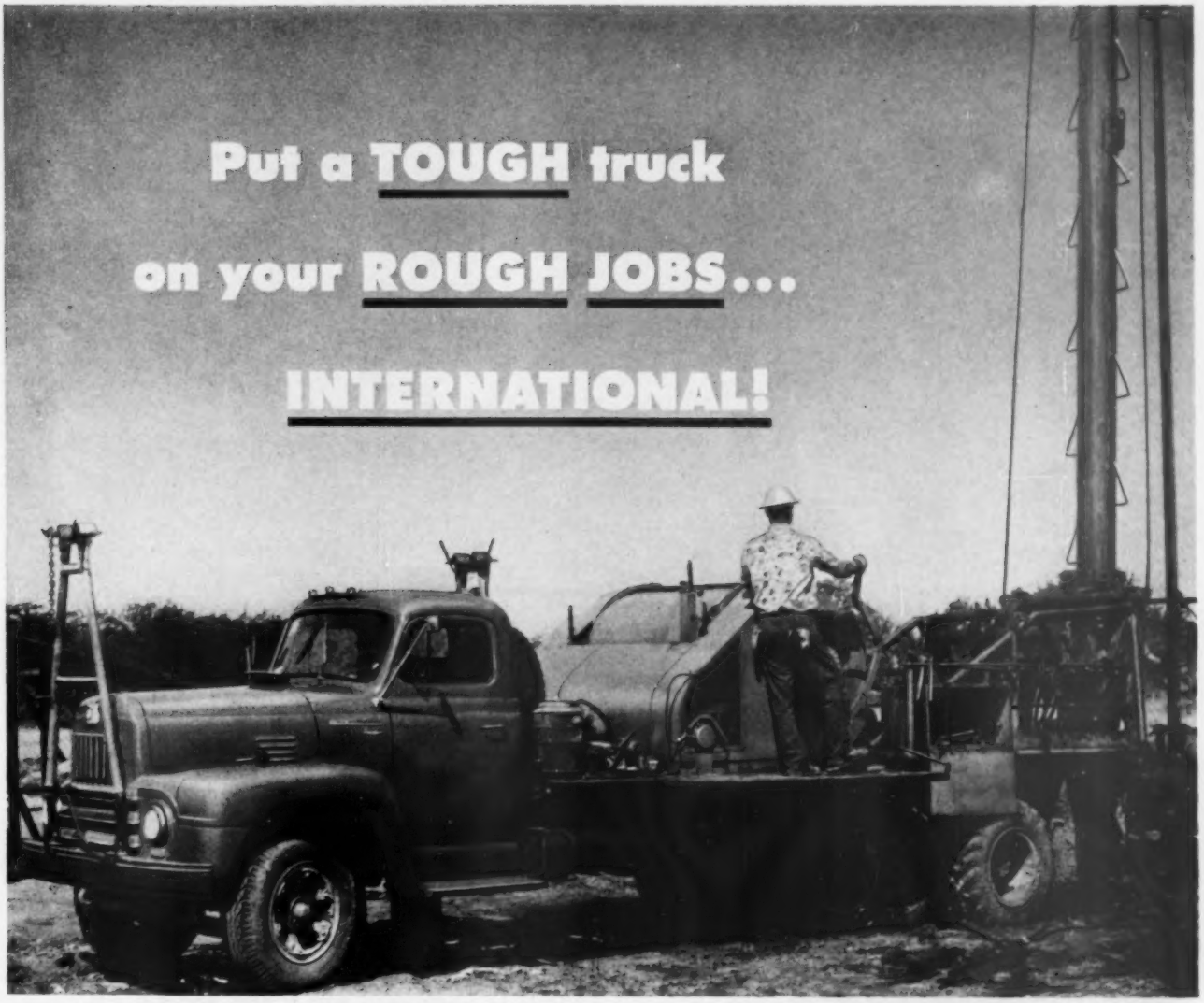

Model LF-190, 157 in. wheelbase, 30,000 lbs. gross vehicle weight, with Franks 87-TM unit pulling tube from well.

• The oil industry may be a tough taskmaster, but not tough enough to lick International stamina and performance on or off the road. Hauling the heaviest type of gear, an International Truck is a bargain because it's Heavy-Duty Engineered for the job.

Look into the facts on International features: All-truck engines, exclusively for truck work . . . traditional truck toughness that has kept International a leader in the heavy-duty field for 20 years . . . 115 basic models, from the smallest pickup to giant six-wheelers.

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The industrial services of modern America have followed in that trail. Thriving farms, towns and cities mark sites where pioneers found only hardship . . . because American industry is truly "All-American."

Today, *all* America shares the benefits of *all* of America's progress . . . because great companies develop and distribute the advantages latent in our natural resources . . . and because great industries like Sun Ship can build and deliver, anywhere in the world, the gigantic equipment needed to convert petroleum and various chemicals into light, heat, power and the other productive forces which serve mankind's comfort and progress.

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$1.50 ACTUAL SIZE 10½" x 10¼"

AT ALL LEADING BOOK STORES—OR SEND COUPON

Shell Oil Company and its employees co-operated with Mr. Hollyman to make this picture story possible—and offer this announcement as a service to the men and women who have made oil the nation's No. 1 source of energy.

"The Oilmen," published by Rinehart & Company, Inc.
First Edition available May 1, 1952

Rinehart & Company, Inc., Dept. 1
232 Madison Avenue, New York 16, New York

Please send me ____ copies of THE OILMEN @ $1.50. I enclose check or money order in the amount of $_____.

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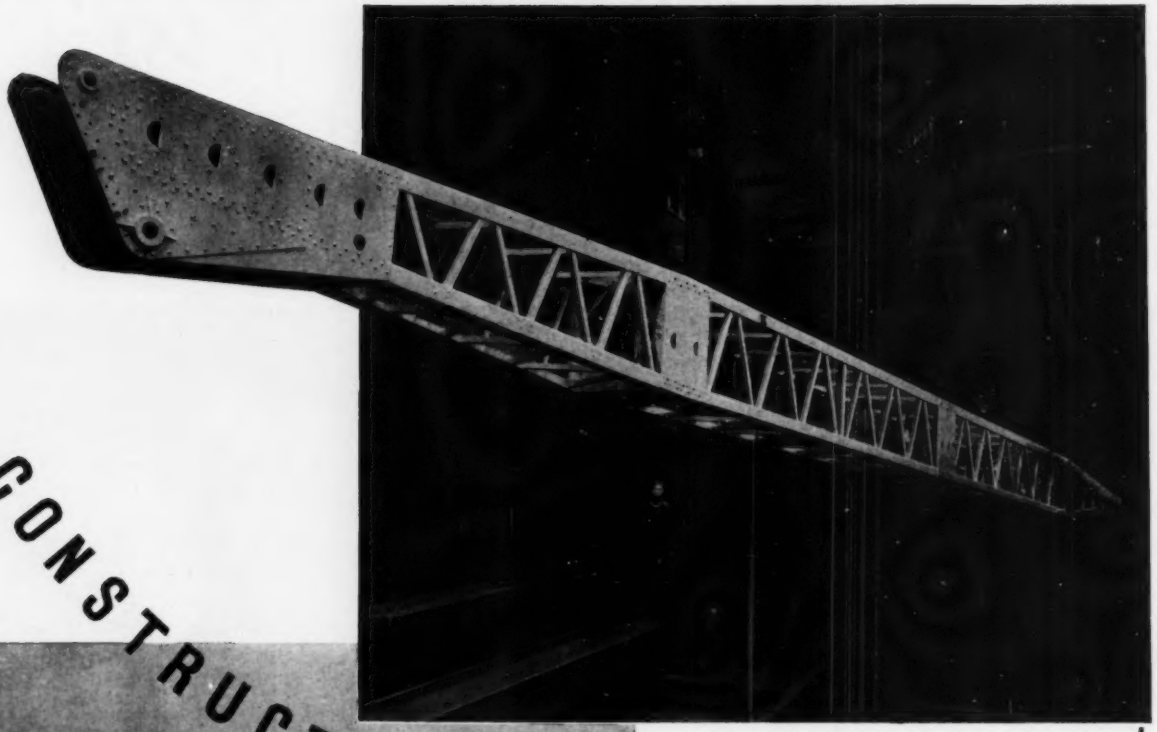

150ft. Mild Steel Riveted Derrick Mast photographed in the Butterley Constructional Department.

CONSTRUCTIONAL STEELWORK by

A view taken in the open before despatch.

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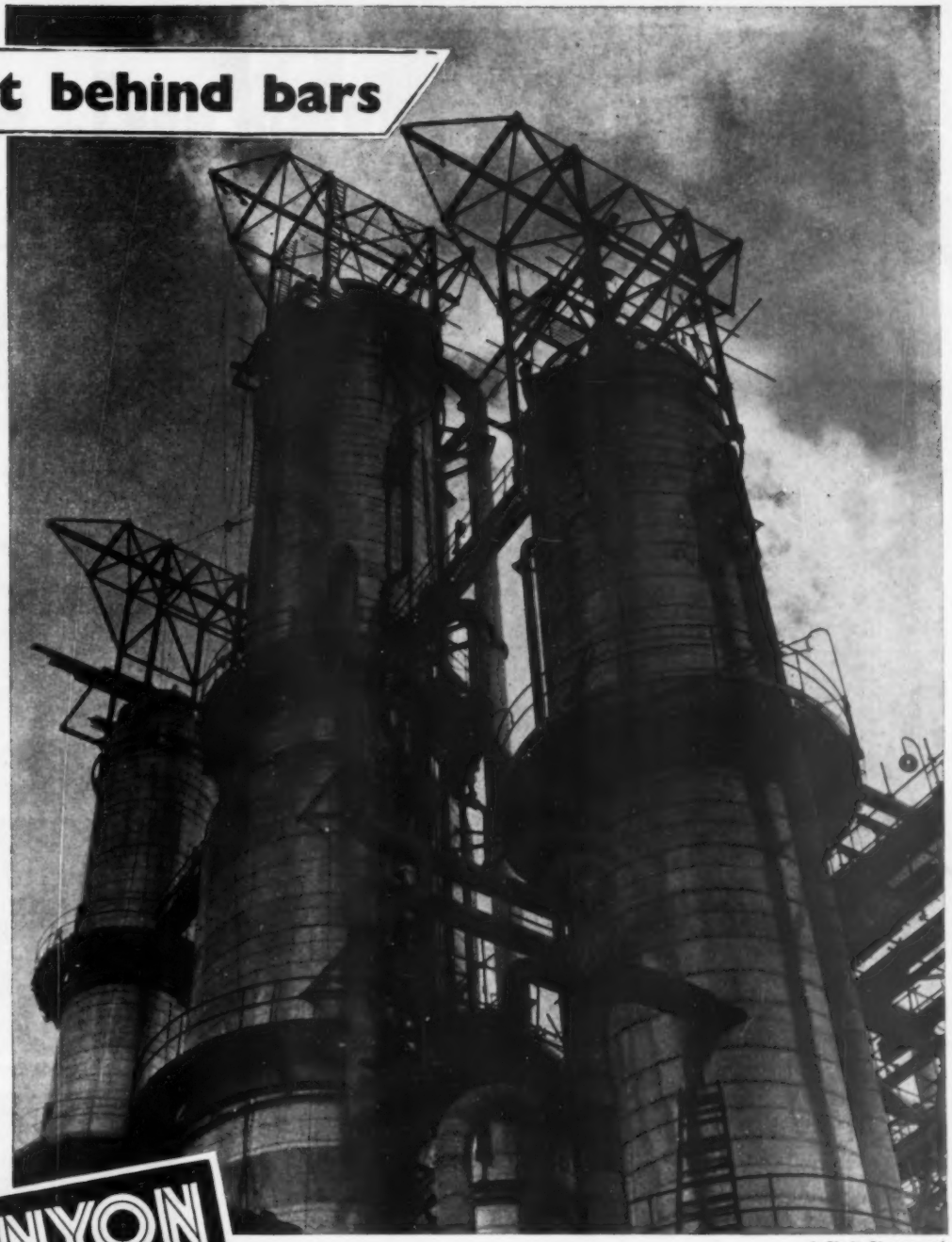
Heat behind bars



A Shell Photograph

KENYON *Planned* HEAT INSULATION

Kenyon provide a *complete* thermal insulation service to the oil industry, including technical advice on thermal insulation specifications, and finishes for all conditions. Supply of materials, application, supervision, on sites throughout the world. The photograph shows columns on the Distillation Unit, M.E.C. project at Ellesmere Port, Cheshire.

Call in KENYON to keep the heat in!

WM. KENYON & SONS (AMERICA) LTD., PERTH AMBOY, N.J., U.S.A.

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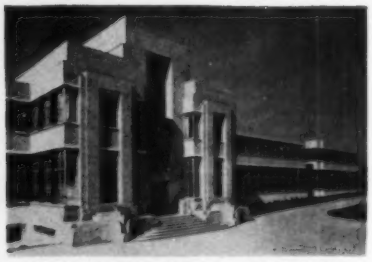

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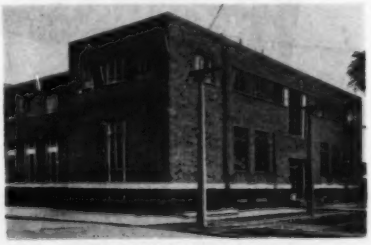

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Now...Even Simpler Counterweight Adjustment!

Quicker than ever; only two nuts to loosen on the weight assembly of most models.

Note also that one crank position is sufficient for all counterweight adjustments.

Socket wrench is applied here to turn pinion. Action of pinion (geared to rack) shifts the weight to desired point.

When first presenting its Series 50 pumping units, Bethlehem introduced the simplest, easiest, safest counterweight adjustment ever devised for this type of machine. It was a feature that had thoroughly proved itself under many gruelling tests . . . and one that continued to prove itself in the field, where it met with immediate success.

And now—adjustment of the weights has been further simplified by using only two binding bolts per weight on units through the 54-in. stroke, three bolts on units with 64-in. stroke, and four bolts on units with 74-in. and 86-in. stroke. In all cases these bolts are "in line" so that they are even more accessible than on the earlier models.

The operator, after loosening the bolts, merely applies his socket wrench to the end of a pinion shaft. He moves the wrench gently, with little or no effort, and the weight shifts position. Numbered graduations on the crank and an index on each outer counterweight shell, facilitate adjustment.

It's all so effortless and safe! No climbing or scrambling. The operator stays on the ground, and there's nothing than can fall from the unit and hurt him.

Write us for more detailed information; it will be furnished promptly.

Bethlehem pumping units are available in many sizes and types, to cover a wide range of pumping conditions.

Investigate, too, Bethlehem's complete line of rotary drilling equipment—drawworks, slush pumps, crown and traveling blocks, swivels, and rotary tables.

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BETHLEHEM STEEL

How earnings work to produce more oil

IMPORTANT FACTS FROM THE 1951 ANNUAL REPORT OF STANDARD OIL COMPANY (NEW JERSEY)

IN THE FREE WORLD, people use tremendous amounts of oil. Meeting their needs, rising year after year, has been one of the notable industrial accomplishments of our time.

For example, the peak war effort in 1945 pushed use of oil 23% higher than in 1940. This looked like a mark that would not be topped for years.

But vigorous post-war reconstruction, and expansion of industry, transportation and agriculture, made oil use in 1946 greater even than in 1945. And in 1951 it was 58% higher than in 1946.

To supply this oil has called for great expansion by the petroleum industry. It has meant new wells, pipe lines, storage tanks, refineries, tankships . . . in times of high costs.

The job has required a vast outlay of money, *which has been provided largely by the industry's own earnings.*

How this works out is shown in the case of Standard Oil Company (New Jersey), an American corporation having investments in companies carrying on the varied functions of the oil business in the United States and abroad.

Consolidated net income of Jersey and affiliates for 1951 was $528,461,000. Of this, $278,862,000, or 53%, was used to help provide new equipment.

In the six years since 1945, Jersey and affiliates have spent $2,350,000,000 for replacement and expansion of facilities. Depreciation and depletion reserves provided only 44% of that amount. The largest share of the expenditure was met by the reinvestment of earnings.

During 1951 alone, to do their part in supplying more oil for the free world, companies in which Standard Oil Company (New Jersey) has investments:

Discovered Oil

In the United States, made new oil discoveries in the Williston basin, the Uinta basin, and Texas . . .

In Latin America, extended known fields in Venezuela, and opened up a new area in Colombia . . .

In the Middle East, Arabian American Oil Company made two important discoveries, one in the offshore waters of the Persian Gulf . . .

Developed Production

In the United States, drilled more wells than in any year since 1937, and greatly expanded secondary recovery operations to get more oil from existing fields . . .

In Venezuela, completed 190 producing wells . . .

In Canada, increased total producing wells from 844 to 1,140 . . .

In the Middle East, Arabian American Oil Company and Iraq Petroleum Company increased production 57% . . .

Expanded Refining Capacity

At Winnipeg, in Canada, opened a new refinery and, at Edmonton, Sarnia, and Vancouver added facilities . . .

At Baton Rouge, La., and Everett, Mass., enlarged refineries . . .

At Fawley, England, put the largest refinery in the United Kingdom on stream . . .

At Antwerp, Belgium, proceeded with field work on a large refinery . . .

At Durban, South Africa, started work on a refinery, and at Bombay, India, completed arrangements to build a new one . . .

Expanded Transportation

In the United States, boosted pipe line capacity substantially, particularly in the South . . .

Ordered twelve new ocean-going tankships, bringing the post-war total of those purchased or contracted for to 72 . . .

Began to bring Western Canadian oil to consumers in the Eastern provinces by means of two large, new Great Lakes tankers, with a third going in service this spring . . .

In Iraq, Iraq Petroleum Company brought near completion a new 556-mile pipe line from the oil fields to the Mediterranean. It will permit oil production in Iraq to be more than doubled in 1952 . . .

Advanced Research

Put into the search for new and improved processes and products a total of $23,100,000, one of the largest expenditures for such a purpose by any company . . .

Continued Good Employee Relations

The interest of the company and its employees in maintaining good mutual relationships resulted in another year without strikes or work stoppages in the domestic affiliates. This was an important factor in meeting the increased demand for oil . . .

AS THE FREE WORLD GROWS IN STRENGTH, it calls for more and more oil. So, not just to the 254,000 shareholders who own Jersey, but to people on freedom's side all through the world, the two outstanding facts about our Annual Report for 1951 are: (1) Jersey affiliates again did their part in meeting the growing needs for oil; and (2) the competitive business system that did this job produced the earnings to help meet even greater needs in the future.

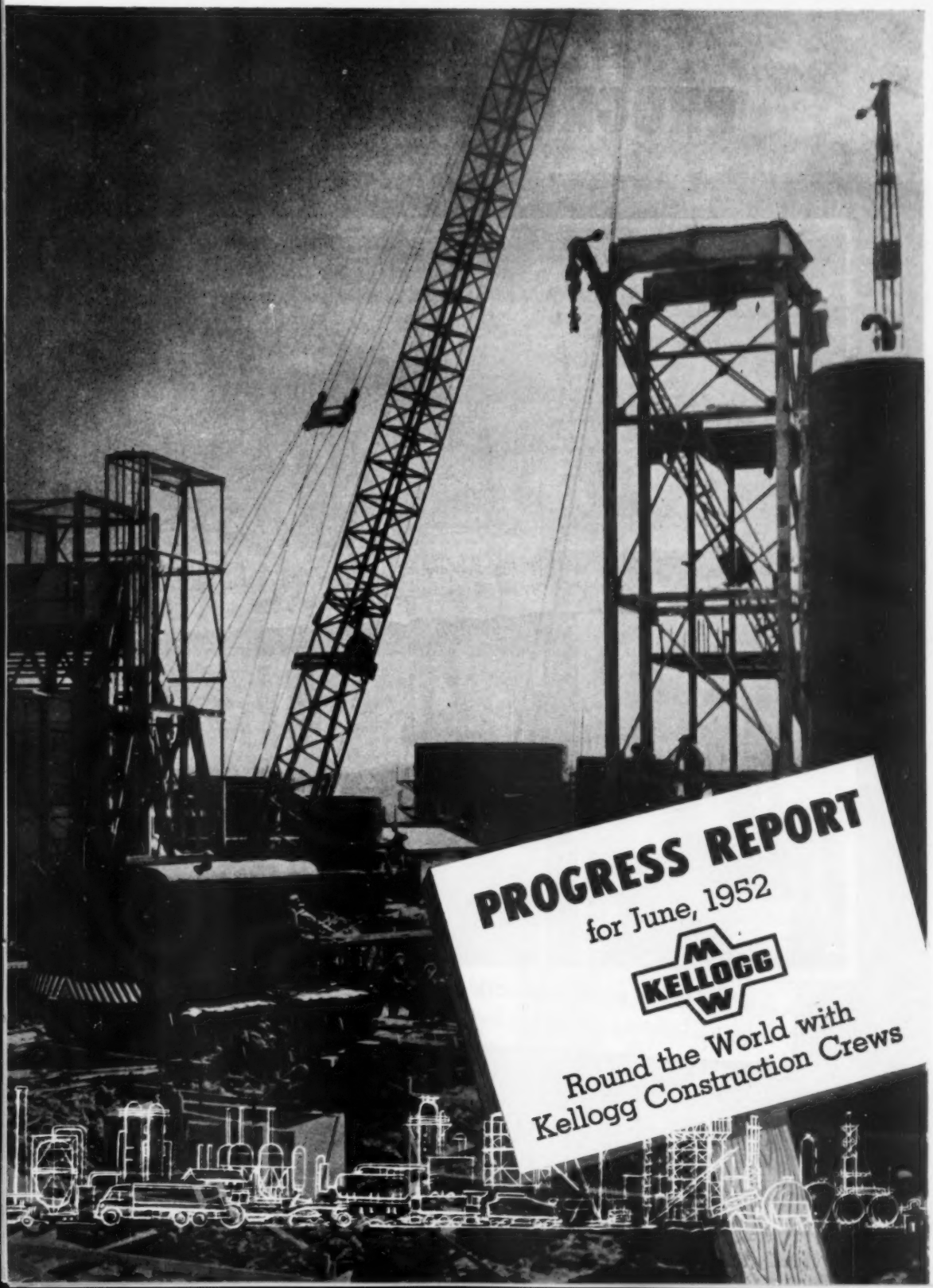
FINANCIAL SUMMARY

Standard Oil Company (New Jersey) and Consolidated Affiliates

Total income from sales, services, dividends and interest	$3,863,317,000
Net income	$528,461,000 or $8.72 per share
Dividends	$249,599,000 or $4.12½ per share
Wages and other employment costs	$600,500,000
Taxes charged to income	$400,700,000
Other taxes, collected for governments	$329,900,000
Spent for new plants and facilities	$381,824,000
Number of shareholder-owners	254,000
Number of employees	120,000

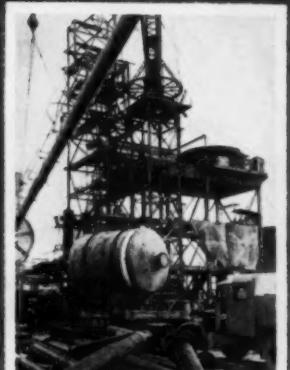
We will gladly send a copy of the full report if you wish one. Write Room 1626, 30 Rockefeller Plaza, New York 20, N. Y.

STANDARD OIL COMPANY (NEW JERSEY)
AND AFFILIATED COMPANIES

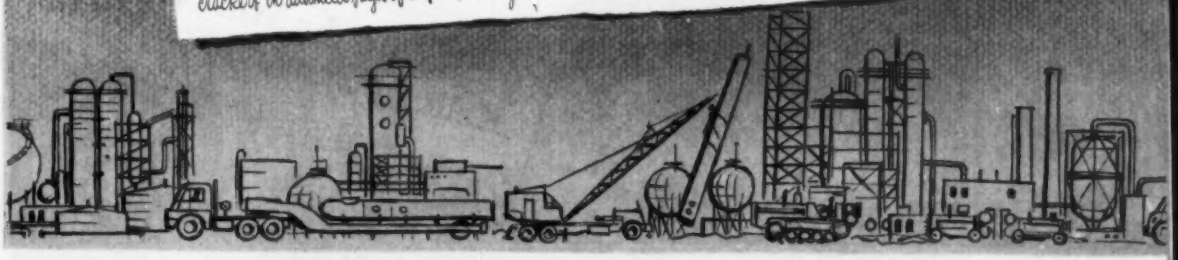

PROGRESS REPORT
for June, 1952
KELLOGG
Round the World with
Kellogg Construction Crews

PROGRESS REPORT for June

On the Gulf Coast, foundations for the world's first Fluid Hydroformer are virtually complete. Pedestal on right foreground will support new-type, continuous, reaction and regeneration vessels. The compressor house is in the background.



In the British Isles, four major projects. Left - one Fluid cracker practically ready to go. Center - one of the two other crackers in advanced stages of construction. Right - shows the progress on fourth project: England's first propane deasphalter.



ROUND THE WORLD WITH KELLOGG CONSTRUCTION CREWS

1952 . . .

(PHOTOS SHOW ACTUAL FIELD CONDITIONS AS OF MAY 1, 1952)

KELLOGG

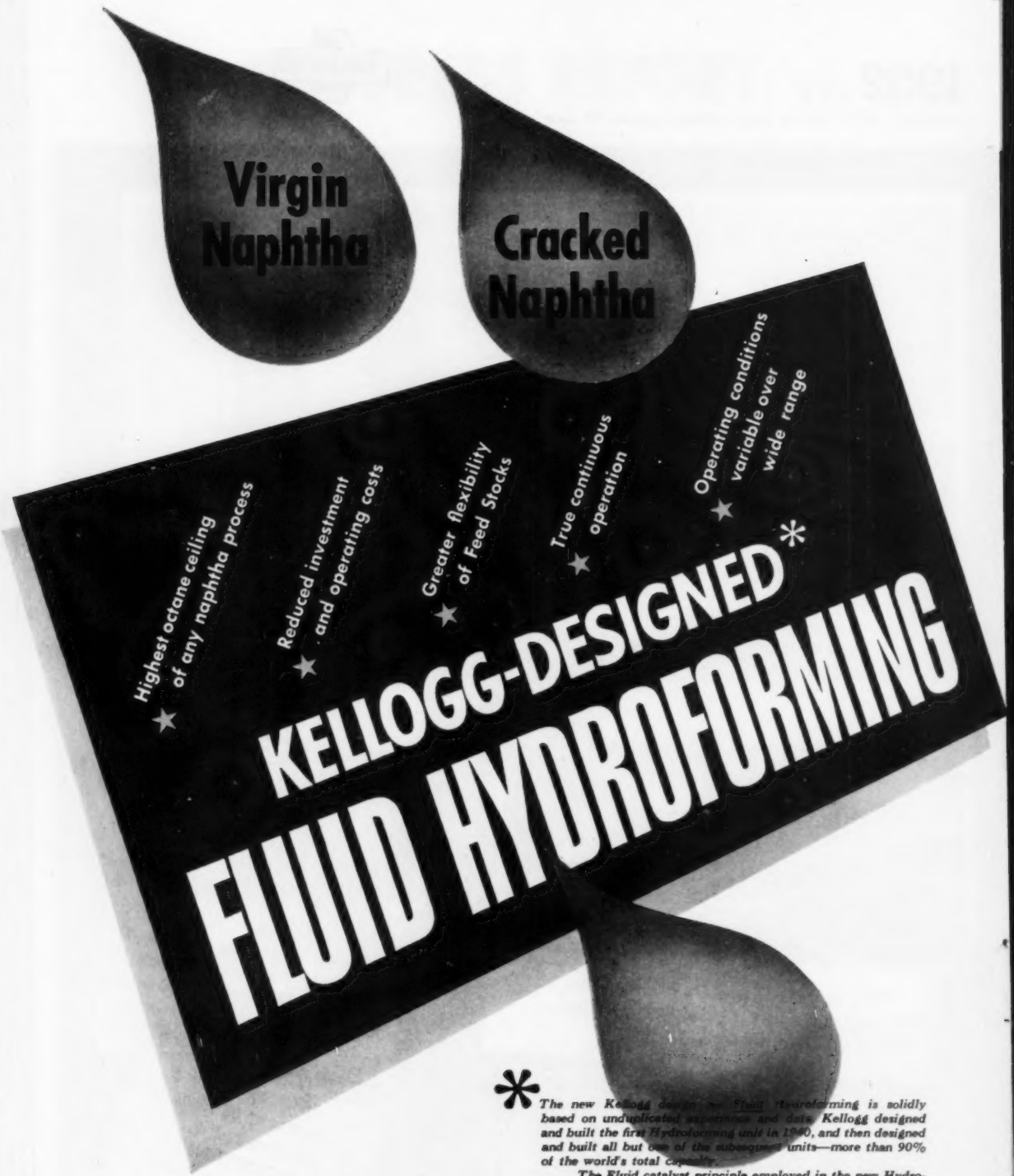
In Ontario, at press time, this Orthoflow was going on stream. Canada's second, it is one of seven Kellogg single-vessel units, built or in work, for domestic and foreign refiners. This cracker and the other processing equipment (including cat poly) operate off one control room, at the far right.

In the Southwest, foundation work for another Orthoflow cracker is just starting. Future location of the units converter is indicated by cross

On the Canadian plains, improved weather conditions speed the completion of an important modernization program including a Fluid cracker. This 90-ton tower between the gas poles is being moved 300 ft. into the new coking and thermal cracking area.

PROGRESS REPORT CONTINUED ON THIRD FOLLOWING PAGE . . .
IMPORTANT!
See next page for message about FLUID HYDROFORMING
M. W. KELLOGG

ROUND THE WORLD WITH KELLOGG CONSTRUCTION CREWS



The new Kellogg design for Fluid Hydroforming is solidly based on unduplicated experience and data. Kellogg designed and built the first Hydroforming unit in 1940, and then designed and built all but one of the subsequent units—more than 90% of the world's total capacity.

The Fluid catalyst principle employed in the new Hydroforming process was rapidly brought into commercial use by Kellogg, as evidenced by the fact that more than 70% of the world's Fluid catalytic cracking capacity is Kellogg-engineered. Naturally, Kellogg has been in the forefront of the development of Fluid Hydroforming, has obtained much data from the company's pilot plants over a period of years and has access to all important data pertaining to the subject.

Greater Flexibility of Feed Stocks!

Reduced Pre-Cracking

Fluid Hydroforming, the *modern* upgrading process, permits a wider range of feeds than other naphtha processes . . . from hexane (for benzene production) to kerosene. It is effective on virgin heavy naphthas, and especially so on high-sulphur cracked naphthas and on a mixed virgin-and-cracked feed.

The *Fluid* catalyst, a finely-divided powder moving continuously through the system supported on oil vapors and air, provides improved catalyst-naphtha contact and hence improved reaction. And since operation is continuous, the system gives steady, uninterrupted production on any given feed.

Specifically, a 55 octane naphtha can be reformed into automotive gasoline stock with a clear octane rating of 95 CFR-R, which means a final aviation gasoline product with rich-mixture aviation octane ratings above 175, with the addition of 4.6 cc of tetraethyl lead.

Fluid Hydroforming produces higher octanes than any other process of its kind . . . at low operating costs . . . and, compared with fixed-bed Hydroforming, at considerably lower initial investment.

A Kellogg bulletin, "FLUID HYDROFORMING", gives detailed data on the comparative performance, yields and octane ceilings of the process. It will be mailed on request.

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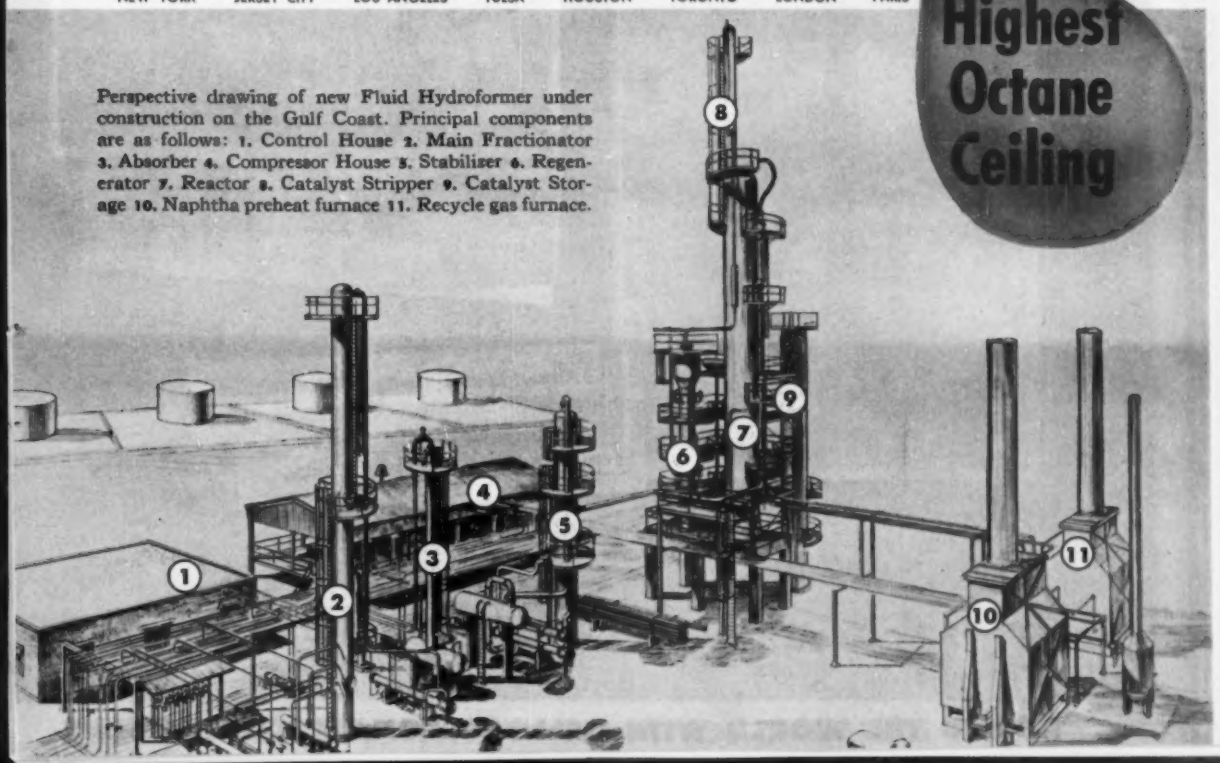
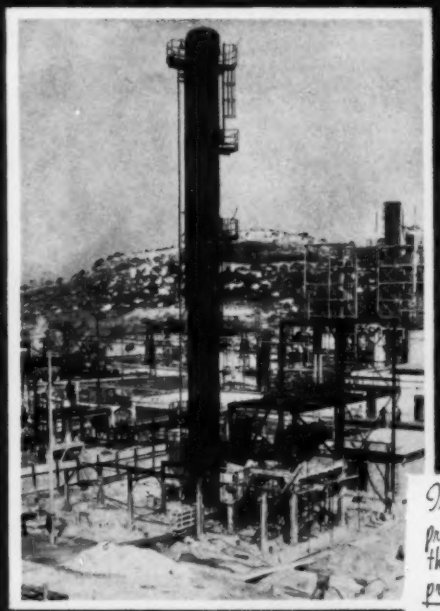
Highest Octane Ceiling



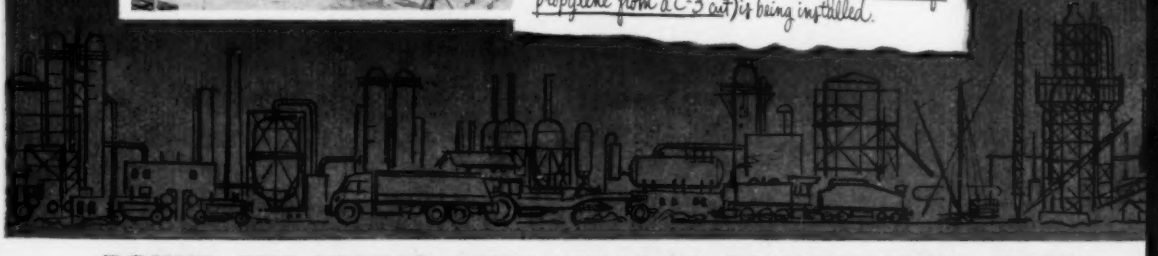
Perspective drawing of new Fluid Hydroformer under construction on the Gulf Coast. Principal components are as follows: 1. Control House 2. Main Fractionator 3. Absorber 4. Compressor House 5. Stabilizer 6. Regenerator 7. Reactor 8. Catalyst Stripper 9. Catalyst Storage 10. Naphtha preheat furnace 11. Recycle gas furnace.

PROGRESS REPORT for June



On the East Coast, piling is just about completed for another mammoth Kellogg cracker. With a reactor throughput of 63,000 BPD, it will be slightly larger than one Kellogg completed last year for the same refiner.

In Southern France, a refinery-wide modernization program has been underway for over a year. Currently, this many-trayed tower (for the close fractionation of propylene from a C-3 cut) is being installed.

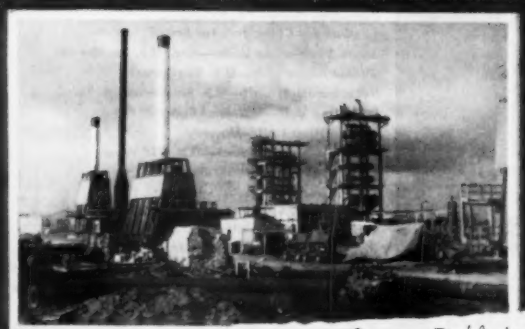


ROUND THE WORLD WITH KELLOGG CONSTRUCTION CREWS

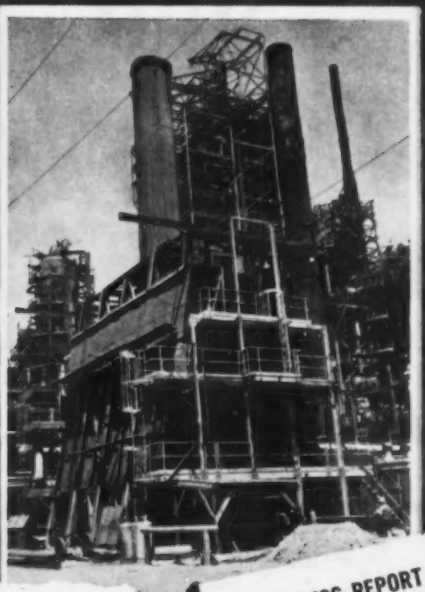
1952 . . . continued . . .

(PHOTOS SHOW ACTUAL FIELD CONDITIONS AS OF MAY 1, 1952)

In central Canada, two of the Dominion's largest individual refinery projects are well under way. This sweeping panorama of the entire construction area shows the sites for Canada's largest Fluid catalytic cracker, and its largest atmospheric and vacuum distillation unit



In Argentina, it's a complete 28,300-BPD refinery. Including Fluid Cracking Delayed Coking and Alkylation, the job is moving steadily along aided by special schools set up to train local craft workers.



Down in Texas, two of the country's earliest Fluid crackers are revamped. The construction of this Kellogg-designed A-frame furnace was part of the extensive project.

PROGRESS REPORT
CONCLUDED
ON NEXT PAGE

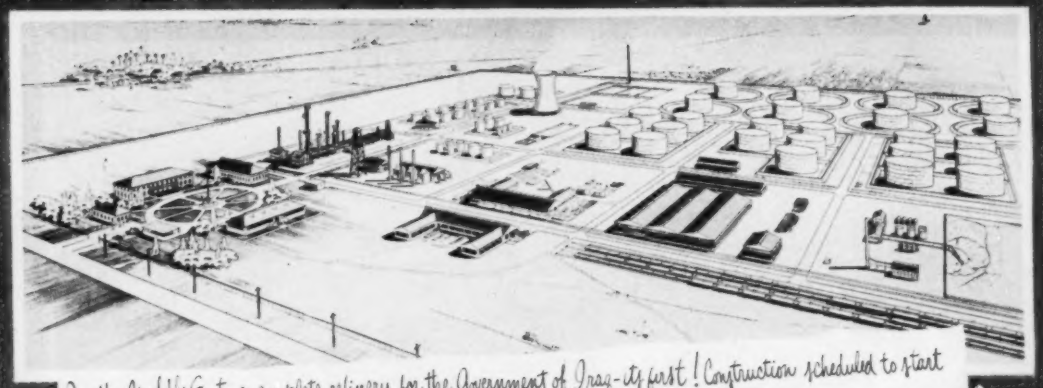
M. W. KELLOGG

ROUND THE WORLD WITH KELLOGG CONSTRUCTION CREWS

(continued)

PROGRESS REPORT for June 1952

(PHOTOS SHOW ACTUAL FIELD CONDITIONS AS OF MAY 1, 1952)



In the Middle East, a complete refinery for the Government of Iraq - its first! Construction scheduled to start later this year under Kellogg supervision

Out in Ohio, the site is cleared for another Orthoflow unit. Job includes considerable other new equipment as well as revamp work on existing units.

OTHER MAJOR CONSTRUCTION PROJECTS SCHEDULED

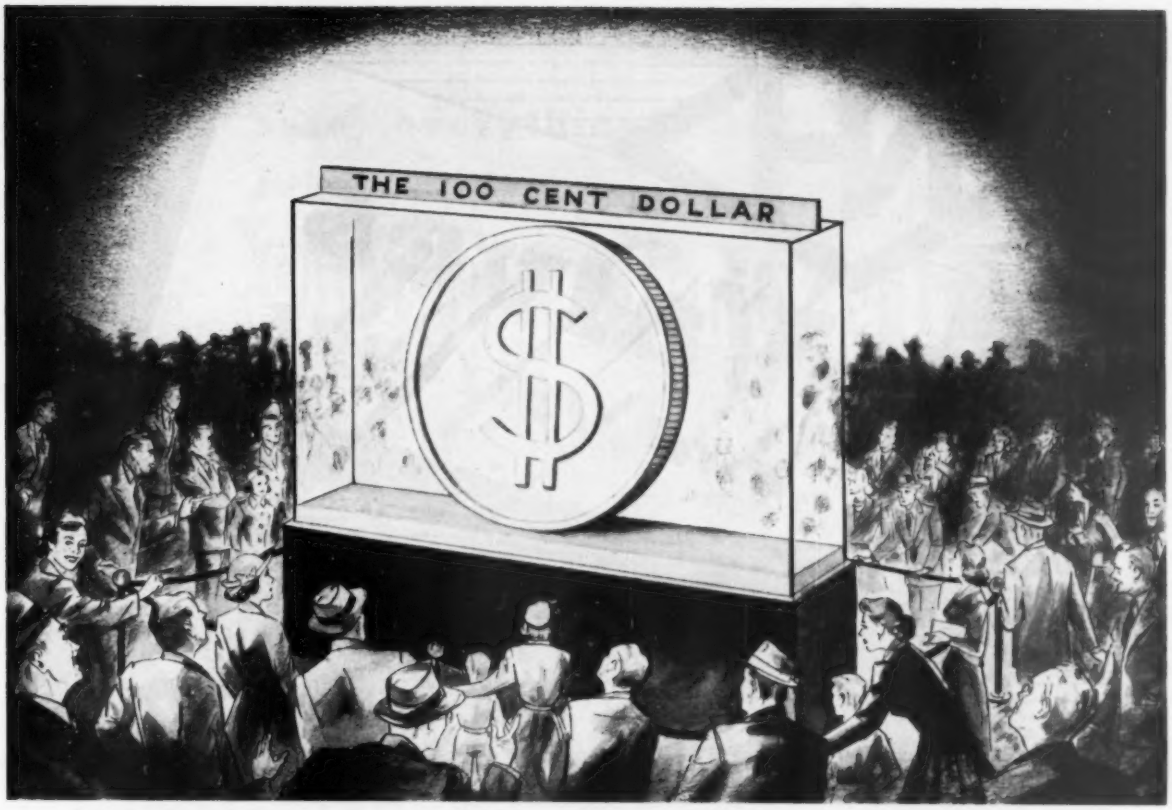
- Alkylation Plant—*U.S. East Coast*
- Ammonia Plant—*U.S. West Coast*
- Cat Poly Units—*two, England and Italy*
- Complete Thermal Refineries—*One for Chile; two for Brazil*
- Crude Distillation Units—*two, U.S. Southwest*
- Deasphalting Unit—*U.S. Southwest*
- Decarbonizing Unit—*U.S. Southwest*
- Desalting Unit—*U.S. East Coast*
- Fat Splitting Unit—*Norway*
- Iso Octyl Alcohol Plant—*U.S. Mid West*
- Olefin and Petrochemicals Plant—*Italy*
- Orthoflow Crackers—*two, U.S. East Coast and Germany*
- Phenol Treating Unit—*U.S. Southwest*
- Phthalic Anhydride Plant—*England*
- Solexol Decolorizing and Fractionating Unit—*Norway*
- Synthol Plant (Gasoline from Coal)—*South Africa*
- Thermal Reforming Unit—*Italy*

In eastern Canada, construction of the world's first phenol-from-cumene plant is being pushed rapidly. At press time, foundation piling had just been completed and erection was under way.

SEE NOVEMBER ISSUE THIS PUBLICATION FOR NEXT PROGRESS REPORT

M. W. KELLOGG

ROUND THE WORLD WITH KELLOGG CONSTRUCTION CREWS



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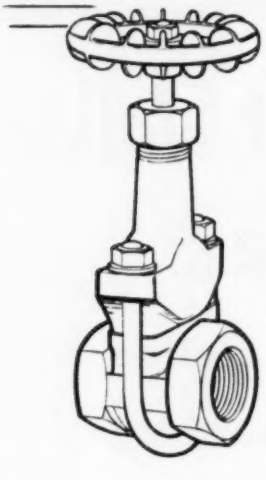

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These are just some of the important reasons why you should select Platforming to solve your reforming problems and to improve your position in meeting the demands of today's competitive markets. Other refiners have done it. *It's a matter of record.*

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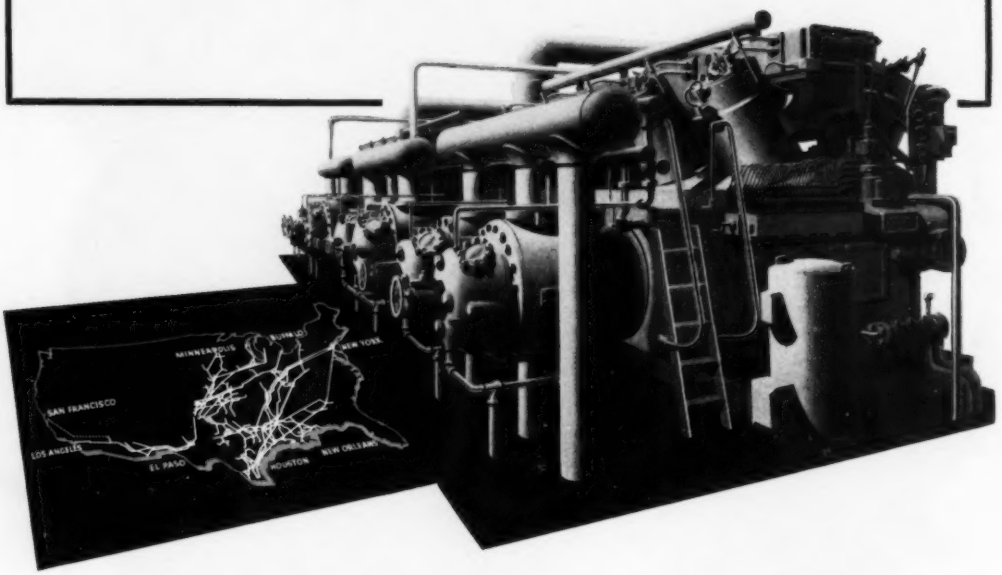

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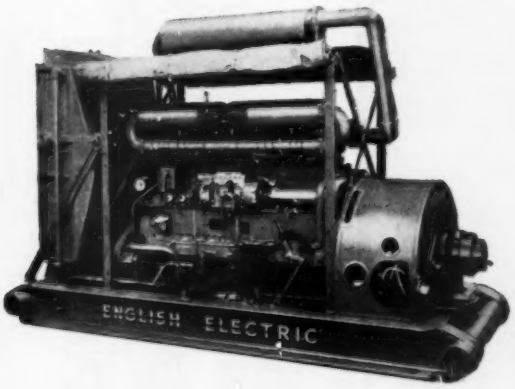

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VOL. 23 NO. 6
JUNE 1952

World Petroleum

THE MANAGEMENT PUBLICATION OF THE INTERNATIONAL PETROLEUM INDUSTRY

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THIS MONTH'S COVER

Drawing by our staff artist shows workers pulling rods on a producing well for periodic cleaning and overhauling.

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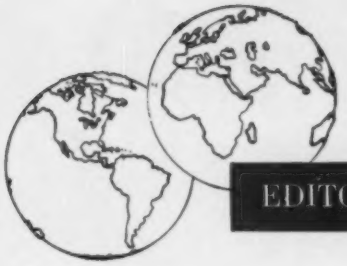


EDITORIAL

OIL'S CONTRIBUTION TO HUMAN PROGRESS

IN THE economic readjustment taking place throughout the world, slowly and in many areas most painfully, the petroleum industry has at once a great stake and a great part to play. Oil always has been international in its impact. The astonishing growth of the industry during the near-century of its commercial existence and the steadily broadening application of its products, particularly during the past fifty years, provides ample testimony to its achievements in multiplying the effectiveness of human efforts and in lessening the drudgery involved in the struggle of mankind to maintain life.

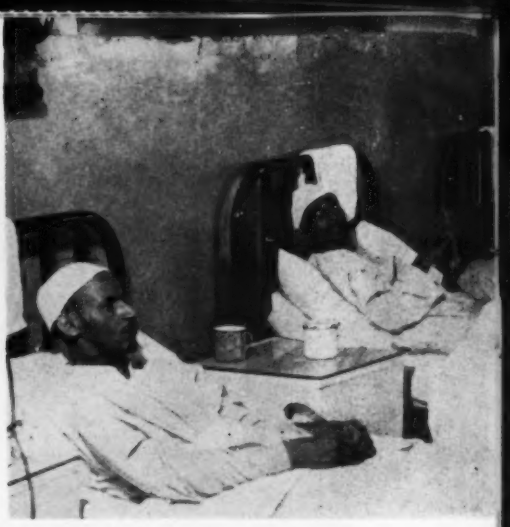
In the western world, where the industry has had its most rapid development, the message of petroleum has been well learned and energetically applied, but to a vastly larger segment of the human race, oil has remained something far removed and of only limited concern to daily lives and occupations. The change that is now taking place has come about through the spread of the industry to new fields throughout the world. It was accelerated by the late war which demonstrated the decisive influence of oil in determining the outcome of military conflict and by the events of succeeding years which show that in this day and age it is essential to all industrial progress.

In a world in which confidence in the future is still weak and in which the signs and portents of a better day are difficult to determine, it is encouraging to note the improvement that has taken place with the development of petroleum facilities domestically based. Every country that commands an indigenous output of oil, no matter how small, is working actively to increase its supply and those that can discover within their borders physical indications pointing to the possible procurement of such hidden resources are working no less energetically with the aid of modern scientific methods to determine whether they hold like resources.

When the broad program of assistance to European countries through the Economic Cooperation Administration was set up, its administrators decided to give a leading place in its plans to the upbuilding of petroleum production and refining in Western Europe as a means of accomplishing an early improvement in the trade and financial position of those countries. Those who have had opportunity to observe the results of this undertaking realize that it has been very helpful, and while it has not solved all the difficulties of their situations, it has been useful in lessening tensions.

For the world as a whole, the big problem today is to correct the imbalance created by the destruction and disruption resulting from war. It involves many changes, including readjustment of revolutionary political and social systems violently imposed and unwisely directed. It requires the better utilization of national resources, the multiplication of man's ability to produce, the freer interchange of ideas and commodities, and the inculcation of ambition to rise above the sordid level of mere animal existence. These are simple objectives, but not easy of attainment and not to be arrived at quickly. The encouraging thing is that there is a growing appreciation of the truth that under present day conditions humanity is indivisible, and that progress, though necessarily uneven, must be universal if civilization is to advance or even to survive. Organized efforts to inspire an ambition for better living and to provide the means of realizing it have been established and are moving forward despite setbacks and often a gloomy outlook.

To this endeavor, the petroleum industry is contributing both directly and indirectly, partly by the very nature of its operations and partly by the location of its activities in regions where the need for material improvement is greatest. By bringing oil products to tillers of the soil in regions where primitive methods have ruled from time immemorial, food production is multiplied by efficient tools and power equipment for operating them. Creation of new desires and the means of satisfying them is the whole story of human progress, and this is the story oil conveys. With its horizons enormously widened and the conviction firmly established that the extent of undeveloped hydrocarbon deposits is vastly greater than was ever conceived as recently as a generation ago, petroleum is free to extend its scope without limitation. Its remaining task is to continue this development and to adapt its products to the demands of an ever-changing world in a service that promises to make it a better one.



Technical instruction for Kuwait employees at Magwa.

KUWAIT OIL COMPANY

PROVIDES SOCIAL SERVICES AND TRAINING FOR ITS WORKERS

Arab trainee with his lunch on opening day of canteen.

BY E. LAWSON LOMAX

PRIOR TO THE commencement of operations by the Kuwait Oil Co. Ltd., much of the Shaikdom of Kuwait, in common with other countries in the region at the head of the Persian Gulf, was little more than a sandy desert, with a climate in which great heat was the predominant factor controlling the living conditions of the population, conditions which were highly uncomfortable for the personnel engaged in the heavy manual operations involved in exploring and developing an oil field.

Under such conditions, the lost time factor through various disabilities was a very important one when work had to go ahead continuously, and improvement in living and working conditions, aside from adding to the comfort of the workers, was considered a movement which would amply repay any special expenditure on that account.

These improvements first of all included medical facilities to care for the health of employees and the erection of houses for the imported staff of such a quality and supplied with such amenities as would render their leisure hours times of recuperation after their day's work, as well as providing recreation and enjoyment during these leisure hours.

Naturally, at the commencement of operations and before the presence of oil in large quantities had been proved, these services were restricted to essentials, so that in 1947 at Kuwait the only medical staff was two European and four Indian doctors and a number of nursing orderlies. The hospital accommodation consisted of three Nissen huts and tents. Serious cases had to be evacuated to Abadan or the United Kingdom for treatment, while for emergency operations a surgeon was flown from Abadan. Mention should be made here of the valuable medical assistance given by the staff of the American Mission from the Dutch Reformed Church of America.

As the numbers of staff and employees increased, so did the medical facilities. In addition to the hospital at Kuwait, outlying dispensaries were developed at Warah, Ahmadi, Magwa and Mina-el-Ahmadi, which were attended by doctors and nursing orderlies.

By the end of 1948 the number of persons employed directly by the company and through contractors working for it exceeded 18,000. The hospital staff, both professional and non-professional, had increased accordingly, and now consisted of a chief medical officer, a surgeon, eight medical officers (British, American, and Indian), a hospital matron, 17 nursing sisters, nine staff nurses, two dental surgeons, a physiotherapist, a radiographer, and three laboratory technicians.

The year 1950 saw the growth of special departments and clinics to cope with diseases and sicknesses arising from the climatic and general conditions peculiar to such a tropical country. A new well-equipped clinic was opened at Ahmadi for the treatment of out-patients, thus making more space available in the hospital at Magwa.

This hospital at Magwa, which possesses the most modern equipment, now contains six wards with additional separate blocks for infectious diseases, ma-

Hospital services are available for company employees.

Dental care for Kuwaitis is new since the country's oil development.

ternity and family cases. All are air-conditioned and mosquito proof. The total accommodation is 200 beds.

Ancillary services include a well-equipped pathological department, an efficient X-ray department, a fully equipped physiotherapy department, with occupational therapy for Arab patients; and an opthalmic, ear, nose, and throat department.

Hospital catering is under a European chef, who has control of three kitchens, situated at suitable points between the wards. These cater for all necessary medical diets and for the widely varying menus required by different nationalities.

All perishable foods are kept in cold storage, and are of a variety such as to afford wide choice to Arabs, Pakistanis, Indians, Americans, British, and many other nationalities from tanker crews of all nations.

The medical department also includes a self-contained modern dental center staffed by two dental surgeons, two dental technicians, a receptionist and orderlies. There is also a medical reference library and a permanent cinema screen for the showing of various types of technical films.

Large supplies of medical stores are kept under the most carefully regulated conditions to preserve their quality and efficiency.

The Ahmadi clinic, with its own laboratory, deals with the great bulk of the out-patient work for all grades of employees. Special clinics are held daily for ante-and post-natal cases, family, and skin affections. Cases are referred from this clinic for specialized investigation and treatment in the hospital and for physiotherapy or consultant opinion. There is an up-to-date heat stroke treatment room in the clinic, which gives 24-hour service with medical officers on duty or on call.

Two smaller dispensaries, staffed by doctors and nursing orderlies, are situated at Mina and Warah, both having a well-equipped heat-stroke room.

A centralized ambulance service is based on the Ahmadi clinic with three ambulances standing by at all times. Each of them has an Arab ambulance attendent whose supervision is the duty of the medical department.

Experience has proved the need for a special desert rescue procedure. Emergency packs therefore have been devised and issued to radial points where rescue vehicles may pick them up on the way to desert accidents or emergencies.

The total medical staff of all grades numbers 288, made up of different nationalities, and includes 16 doctors, 22 nursing sisters, 18 nurses, 11 male nurses, and 22 nursing orderlies and ward boys.

A 24-hour service, with doctors on duty, is available, and house visits are made by doctors on request from those too ill to attend the clinics.

The company's health department is staffed by two British health inspectors under the supervision of the chief medical officer. All aspects of public health work in the oilfield areas come within the scope of this department including refuse disposal, water supply, rodent and insect control, industrial hygiene, infectious disease contacts control and antirabies measures. The pathological and health departments work in close liaison on the analysis of water and food supplies and potential outbreaks of infectious diseases.

A fully-qualified veterinary surgeon works in conjunction with the health department on the supervision of slaughterhouses and inspection of carcases before and after slaughtering. He also provides veterinary services to domestic pets belonging to company employees.

Welfare and recreational facilities have been extensively developed within the past two or three years, and are being brought up to a high standard for all classes and grades of employees.

In the Hubara Club the company has provided quarters for its staff, which makes it probably the finest club in the Middle East. With its outdoor and indoor dancing floor, its large illuminated swimming pool and squash courts, it is naturally the center of social activities for the members. Meals can be obtained until reasonably late hours at night and a good library is provided. It is the parent club of many smaller associations.

Cricket, Association and Rugby football, hockey, tennis and squash are all played regularly, matches being played against teams from other companies in the Persian Gulf, as well as against H. M. and U. S. ships during their visits to the Port of Mina-el-Ahmadi, the crews welcoming these games ashore.

Among other activities is the yachting at the Cumberland Yacht Club, situated on Kuwait Bay, where there are four 'X' Class racing yachts, two standard whalers and a motor boat available.

In the winter months, there is hunting for gazelle and hubara (lesser bustard). Riding is a favorite form of exercise and amusement, while there is good fishing in the Persian Gulf from the company's launches, which can be borrowed when available, king mackerel, barracuda and an occasional shark being the main captures.

Excursions have been organized to such places as Babylon and Ur of the Chaldees, ancient ruined cities of Iraq.

The Unity Club is situated at Ahmadi Ridge, and is used mainly by the Indian-Pakistani staff and also by the Arab staff. A new club is under construction at present designed on the same scale as the Hubara Club. The swimming pool is almost completed, the whole of the club being scheduled for completion by October 1952. These new club buildings will consist of a large main lounge, library, game room, children's swimming pool, open air dance floor, ladies' lounge, card room, large verandas, and sports grounds. The club will be air-conditioned throughout, and will satisfy a long felt need, as the present Unity Club premises, although used extensively, have a number of limitations.

Apartments for the nursing staff at Kuwait's new hospital.

Keen interest is taken in outdoor sports by all categories of employees, who produce excellent teams for hockey, football, cricket, tennis and water polo matches. There is high competitive spirit between the various sections of the staff in these games, and a number of league matches and test matches are played annually for shields and cups presented by various personalities in Kuwait. When possible, company aircraft fly sports teams from Kuwait to play against other Persian Gulf teams, chiefly at Basra, Bagdad, and Bahrein. The sporting instinct is very strong in Kuwait where there are so few other recreational outlets.

In each staff camp there is a recreation room where billiards, snooker, table tennis and darts can be played. Radio sets are also supplied. Canteens are run in these recreation rooms by the staff themselves. Magazines and newspapers in English and vernacular languages are liberally supplied by the company to these recreation rooms.

A well equipped club for labor known as the Nakhlistan Club is provided in Ahmadi, where employees can read the latest papers and periodicals from their own countries, play games, rest and listen to the radio, or read books from the library. In addition, facilities exist for amateur theatricals and impromptu parties. There are also comfortable reading and recreation rooms in all areas, equipped with radios, gramaphones, newspapers and indoor games. These are well frequented, and are a popular feature among employees. Savings bank facilities are available and are widely used.

A mosque is being finished for the Muslim employees, suggestions for its design having been sought from the Kuwait government.

There is a large Roman Catholic following, and two Italian priests assist in looking after the spiritual needs of the many men from South India who belong to this church.

A British Church of England chaplain has lived in Ahmadi for the last three years and makes regular visits to outside areas. The Roman Catholic and Protestant churches are both situated in Ahmadi.

The company maintains two schools, one for the children of its British-American staff, and the other for Indian and Pakistani children whose parents would otherwise have difficulty in educating their children.

The former has just moved into newly constructed buildings which are up-to-date in every way, with large well-equipped classrooms and well-laid-out playgrounds for the 100 or so children who are taught by a staff of seven British teachers. It is probable that further teachers will be introduced in the near future when it is anticipated that the number attending school will be in the neighborhood of 130.

The school for Indian and Pakistani children has a staff of five teachers. Some difficulty was experienced at one time owing to the variety of languages spoken, but teaching through the medium of English has proved satisfactory. New buildings on exactly the same lines as the school for Western children will be completed in the very near future. The school for British and American children charges nominal fees for the education provided, but for the present the school for the Indian-Pakistani children is provided free of charge. The provision of educational facilities for Arab children is a responsibility undertaken by the state.

It is difficult today to realize that up to three or four years ago there was literally nothing at all at Ahmadi except sand. Nowadays nearly every married quarter has trees and shrubs; in many cases lawns have been established and flowers appear on all sides during the months from February to April. There

Trees and shrubs are being planted to protect employee housing.

Health Commissioner Sheikh Nisf Yousef Nisf, second from left, at a weekly conference.

Minaret of the mosque which Kuwait Oil Company is building for its Muslim employees.

are two gardening associations, both of which are subsidized by the company, which provide trees from a nursery at cheap rates and also make free issues of fertilizers. Many of the main streets are lined with well established trees and public gardens.

Lettuce, cabbages, beets, and carrots have all been grown with success and an attempt is being made this year to produce them on a commercial basis. Many varieties of flowers do well, and great keenness is shown by all sections of the staff to win one of the many trophies presented for the best exhibits.

A training center at Magwa has been established for the training of the indigenous Kuwaiti Arabs. It was first started on an experimental basis, but this preliminary phase has now passed and it has been shown that the Kuwaiti Arab possesses a high degree of latent skill, intelligence, enthusiasm, and adaptability.

Of the 150 trainees at present under instruction at the center, about two thirds are drawn from Kuwait town and the remainder from Ahmadi, with a few from the coastal villages.

They are divided into two age groups, one of 15-19 years, and the other of 20 years upwards.

Many of the trainees are sons of company employees, while others have worked as laborers and have been recommended by their job officers or foremen for upgrading or training in a particular craft. Many have received little or no elementary academic schooling, and are therefore handicapped when it comes to technical training, but in spite of this, they make rapid progress.

The following tradesmen and craftsmen are at present being taught; carpenters (including cabinet making and french polishing), welders (electric, oxyacetylene, and cutting), M. T. electricians, painters, pipefitters and plumbers, general fitters, electricians, bricklayers, and vehicle and diesel fitters. Later on a shop is to be added for sheet metal workers.

The training center is under the direction of a superintendent with exceptional qualifications and experience gained at many training centers in the United Kingdom. He is assisted by a team of British instructors who are all high class craftsmen and able to impart their knowledge to the trainees.

Every trainee passes initially through a basic class, the purpose of which is to accustom him to the workshop atmosphere and fit him for the particular course which he is to undertake, as many of the boys have never previously been in a workshop or seen a bench.

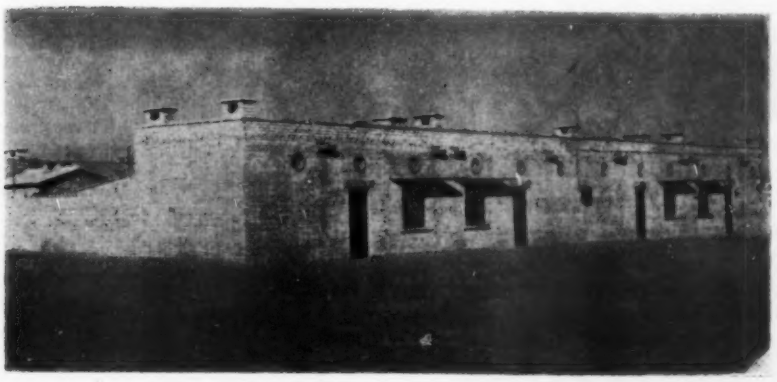
Normally the period of training for the majority of trades runs for two years, but where the skill required concerns a single process, such as welding, the trainee may be passed out in four to six months.

Side by side with the practical instruction, the trainee is taught English, arithmetic and workshop drawing. The trade lectures themselves are prepared in English and then translated into Arabic.

Wherever possible, the trainees are put on constructive and productive work in their own chosen trades in order to instill in their minds the usefulness of their tasks. For example, 25 portable garages have been constructed and completed by trainees and a large number of car radiators have been repaired. All building and adaptation work at the center is undertaken by the trainees themselves.

Company hours are kept at the training center, and a canteen is provided where the trainees can obtain a hot lunch at a small charge.

The center is attracting much interest among the merchants and other residents in Kuwait, which probably will lead to an increased demand for places. It is expected that by the end of June 1952, the trainees undergoing instruction will number about 300.



Houses in the Arab village.

Laying 30-inch pipe on land.

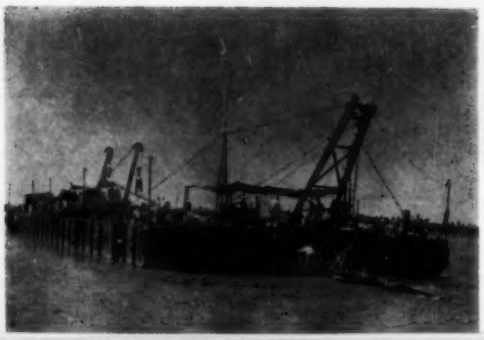
La Paz crude line operating

BY NEAL R. VAN MIDDLESWORTH

CRUDE from La Paz field was pumped into the 30-inch 160-mile "Lightline" between Palmarejo de Mara, on the west side of Lake Maracaibo, and the Paraguana Peninsula for the first time on February 26. The oil arrived in storage at Shell's Punta Cardon refinery on the morning of March 5. It took over 700,000 barrels of crude to fill the line, and La Paz crude is now being pumped at the rate of 135,000 b/d. As soon as the pump station at Palmarejo is complete, it will be possible to pump 235,000 b/d through the line. With the addition of one pumping unit at Palmarejo (the only station on the line), maximum capacity will be 290,000 b/d.

The line is operated by Shell, but is owned jointly by Shell (88.89 percent), Texas (6.66 percent) and Mene Grande (4.45. percent). Deliveries will be made to Mene Grande's Las Piedras ocean terminal as well as to Shell's Punta Cardon refinery. Major contractors on the job included Williams Brothers of Venezuela (land lines); Mahoney Contracting of Venezuela (marine crossings); Gahagan Overseas Construction Corp. (Lake Maracaibo dredging); Macco Panpacific, Inc. (pump stations); and Grant Foster Co. and Maracaibo Towing Co. (salt flats causeway).

"Lightline" was essentially constructed of 30-inch OD pipe, API 5LX specification, varying in thickness from 5/16 to 1/2-inch except for the Lake Maracaibo underwater crossing, where 20-inch OD, ¾-inch wall, Grade B seamless pipe was used. In the main, the pipe was laid bare and above ground on concrete skids. However, special sections are coated and wrapped, and in some cases buried. The lake marine crossing consists of twin 20-inch pipes, about five miles long, coated with coal tar and wrapped with glass fibre pulled into the coating. The line is buried at least five feet below the lake bed, in dredged trenches with a maximum separation of 1,000 feet. The Golfete de Coro marine crossing consists of 14 miles of 30-inch pipe on a causeway constructed across the salt flats on the south side of the gulf, then four miles of actual water crossing, where 30-inch coated pipe was used, wrapped in a 2½-inch reinforced concrete gunite sheath and laid on the bed of the gulf. The total tonnage of all pipe used was 49,000. It is electric weld, fabricated by Consolidated West-



View of Mulberry harbor showing a 120-foot section of 20-inch pipe raised in position for welding in the bell hole.

ern Steel Co. of Orange, Texas, X46 grade, ½-inch wall thickness for the Coro marine crossing and X52 in all other wall thicknesses. The pipe was made in 40-foot joints. The 20-inch pipe for the Lake Maracaibo marine crossing is ¾-inch wall, seamless, Grade B pipe rolled in random lengths by National Tube Co.

The only pump station on the line is located at Palmarejo de Mara, on the west side of Lake Maracaibo. It has a design capacity of 235,000 b/d at 490 psi using two engine-driven centrifugal pumping units with an additional unit installed as a spare. However, with the addition of one pumping unit, maximum capacity will be 290,000 b/d at 790 psi. Units installed here are: three 1,850 hp Cooper-Bessemer dual fuel engines (gas and oil), three Farrel-Birmingham double helical gear speed increasers, three single-stage Byron-Jackson centrifugal pumps, two Deepwell type Pacific centrifugal suction booster pumps with 250 hp electric motor drive, and three 500-KVA 440-volt Chicago Pneumatic dual fuel engine-driven generator sets.

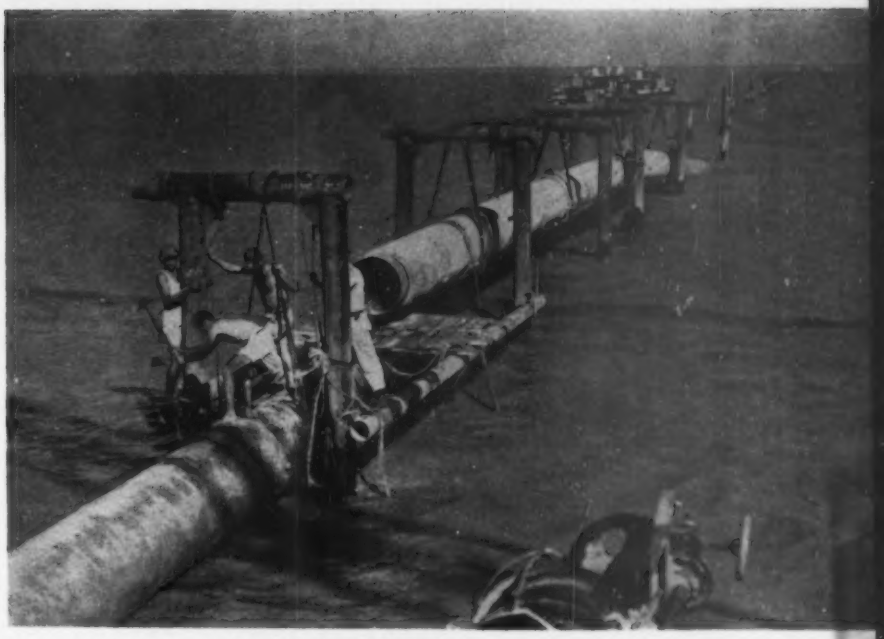
Communications will be by FM radio between terminal points, with automatic relay midway at Dabajuro. One voice and two teletype circuits are provided, and portable radio units are installed in all automotive operating and maintenance equipment.

Corrosion mitigation measures include, in addition to coating on selected sections, cathodic protection by rectifiers at both marine crossings and the buried segment between Palmarejo de Mara and the Lake Maracaibo manifold. Where soil resistance is low or varies abruptly, the bare pipe laid above ground is placed on concrete skids and insulated.

The gunited pipe used for the Coro crossing is buoyant, and therefore yoke-type weights of concrete were placed over the pipe on approximately 20-foot centers. This pipe was pushed and floated in 2,000-foot increments from an especially constructed marine railway on the Paraguana shore between two rows of pipe piles spaced 40 feet apart and staggered on 200-foot centers across the four miles of the water crossing.

The Maracaibo crossing pipe was welded in 120-foot sections and coated in a yard at Punta Palmas. The actual laying was done from a barge made by converting a Mulberry harbor. To this end, no ramps were constructed on the barge, but two TD24 pipe-laying tractors were used for inclining pipe sections into a specially built-in bell hole on the Mulberry harbor for actual welding.

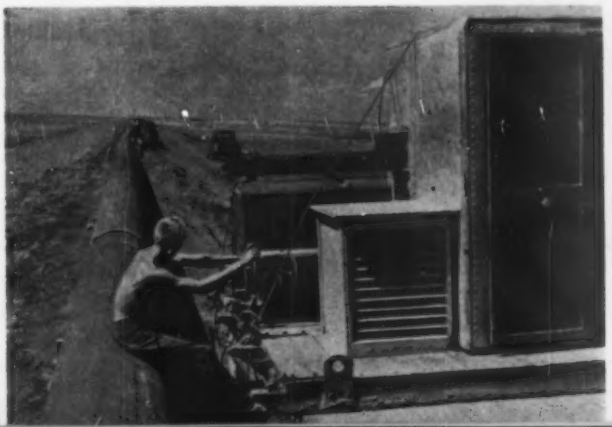
Inspection was carried out by qualified men provided by Shell Pipe Line Corp. from the United States. X-ray inspection of field welds was carried out by International Industrial X-Ray Co., whose technicians examined all welds on the marine crossings and one-third of the welds on the land sections of the line.



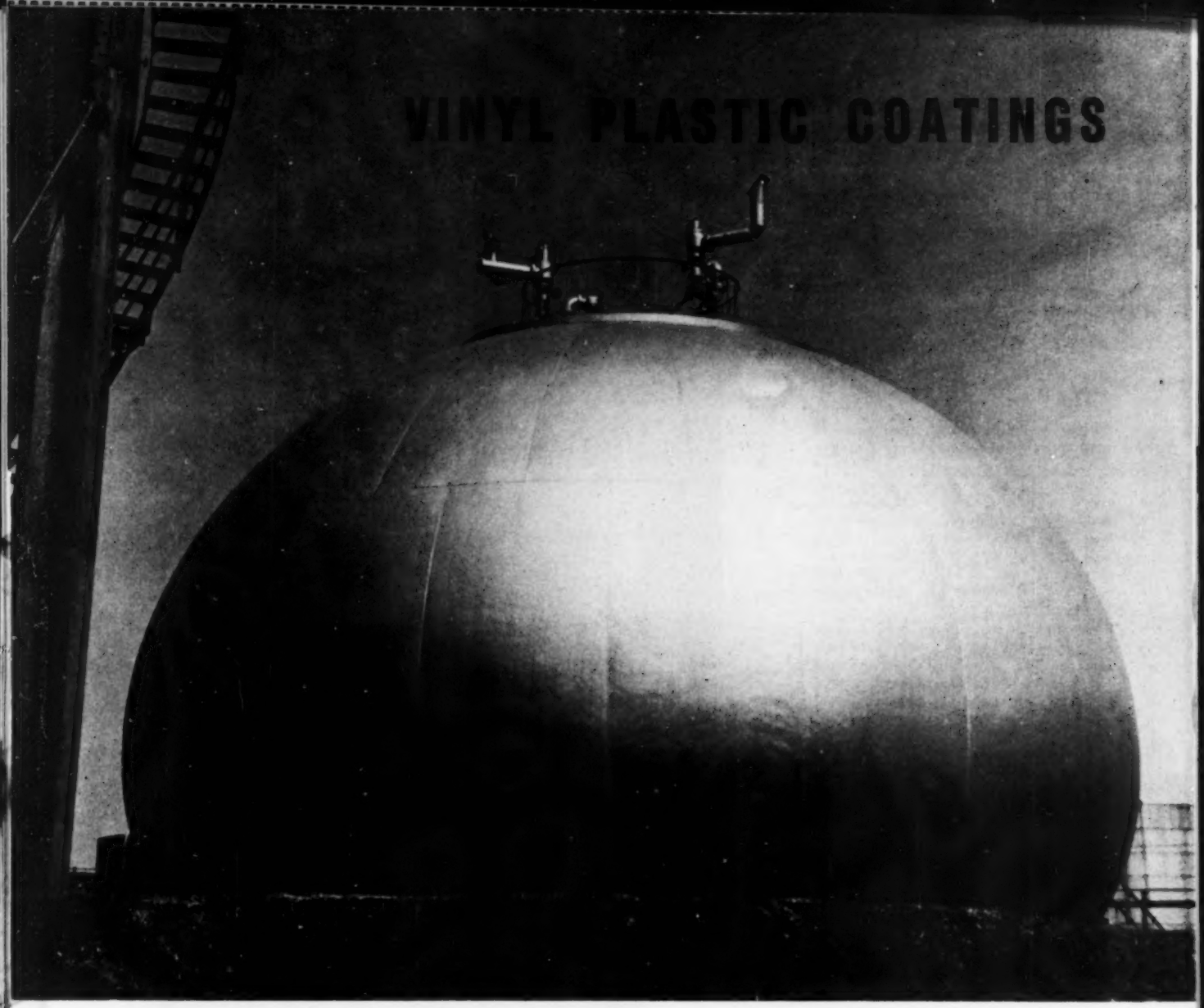
Joining a 2,000-foot length of 30-inch pipe on the Golfete de Coro crossing. The guide piling across this neck of water stretches back to the Cardon refinery on the far shore.

X-ray examination of welds on causeway approaching gulf crossing.

Beveling a joint on Golfete de Coro crossing. Note gunite coating.



VINYL PLASTIC COATINGS



Pressure storage tank subject to an atmosphere of chemical fumes and salt has resisted corrosion after plastic coating.

Coated and uncoated sections of pipe after five months of handling large volumes of high iodine content salt water.

SOME six years ago Humble Oil and Refining Company's special products division began experimenting with vinyl resins as coatings for structures and equipment which have presented special problems. In the period which has elapsed since these experiments were undertaken, vinyl coatings have proved useful in many applications.

In the tropical regions of Colombia and Venezuela these coatings have resisted mildew in employee residences and provided an easily maintained washable surface.

In humid salt air adjacent to the ocean, tanks and other metal structures have been protected against corrosion for extended periods. Plastic coated underwater equipment at offshore locations has resisted fouling by marine growth.

In tankage subjected to hydrogen sulfide and caustic corrosion, vinyl plastics have reduced metal loss substantially.

Drill pipe coated with vinyl resin has resisted corrosion fatigue equally as well as pipe coated with thermoplastic resins of the phenol-formaldehyde group. They have additional advantages in that they may be field applied. No baking is necessary and they form a tough, ductile film.

Pipe lines carrying corrosive substances have had their life greatly extended.

Vinyl resin coatings have given such good results because of their resistance to weathering and water penetration and their chemical inertness. They are not affected by alcohol, oil, grease or by most acids and alkalies at normal temperatures. Limitations to the use of the coverings

are contact with aromatic hydrocarbons and temperatures above about 160°F.

Despite the tendency of plastic coatings to soften in contact with aviation gasoline and certain organic solvents, such as ketones, esters and chlorinated hydrocarbons, there are many places around the modern refinery where the vinyl coatings are proving useful.

Refinery cooling tower piping and supports normally are subject to severe corrosion and scaling. Adjacent equipment also is affected by the over-spray from tower fans. The corrosion is aggravated by water treating chemicals which must be used at some points. Experience has been that metal parts of cooling towers and adjacent equipment can be protected for long periods by plastic coatings.

At one of its larger refineries on the Gulf Coast, a major company found that vinyl coatings protected tankage and structural steel which was exposed to sulfuric acid vapors, mist, and caustic spillage, salt water, and water sprays. A feature not to be overlooked is that plastic coated equipment is easily cleaned. Stains can be washed away without affecting the coating in any manner.

New problems in corrosion were encountered by the industry when offshore drilling was begun some years ago.

First of all, the atmosphere in coastal areas is highly corrosive, being heavily laden with salt. All equipment incidental to off-shore drilling operations was attacked by corrosion from salt water or salt atmosphere. Barnacle growth also became a severe problem.

It became evident in a short time that coatings usually employed on drilling equipment being used on land would not give the required protection. These coatings failed in from six to eight months. The alternate wetting by the spray of sea water and evaporation of this water by the sun broke the film down rapidly. Salt water penetrated the coating in the immersed sections, causing the coating to blister and allow corrosion of the metal to progress.

It was then that the industry started looking for better coatings to give protection from this type of corrosion and to prevent marine growth. The fouling begins as soon as the steel is immersed in sea water through the formation of slimy microbiological film. Subsequently macroscopic organisms attach themselves and grow rapidly into the mature forms visible as barnacles, mollusks, algae, and other fouling growths.

Anti-fouling coatings for application below the surface of water are prepared by the addition of cuprous oxide which is slowly dissolved to poison the attacking organisms. The anti-fouling paint is applied on top of other coats of plastic paint designed to prevent salt water corrosion. Above the water line only the vinyl plastic paint is applied.

Well-head equipment in both fresh water lakes and salt water has required excessive maintenance in past years. In Galveston Bay, for example, it previously was necessary to scrape and repaint all equipment at intervals of six to eight months. Both above and below the water line, salt water and spray penetrated ordinary paints and caused corrosion of metals within a matter of a few months.

First experiments with plastic coatings of both normal and anti-fouling formulas were undertaken in 1948. These applications in Galveston Bay are still in excellent condition after four years of service.

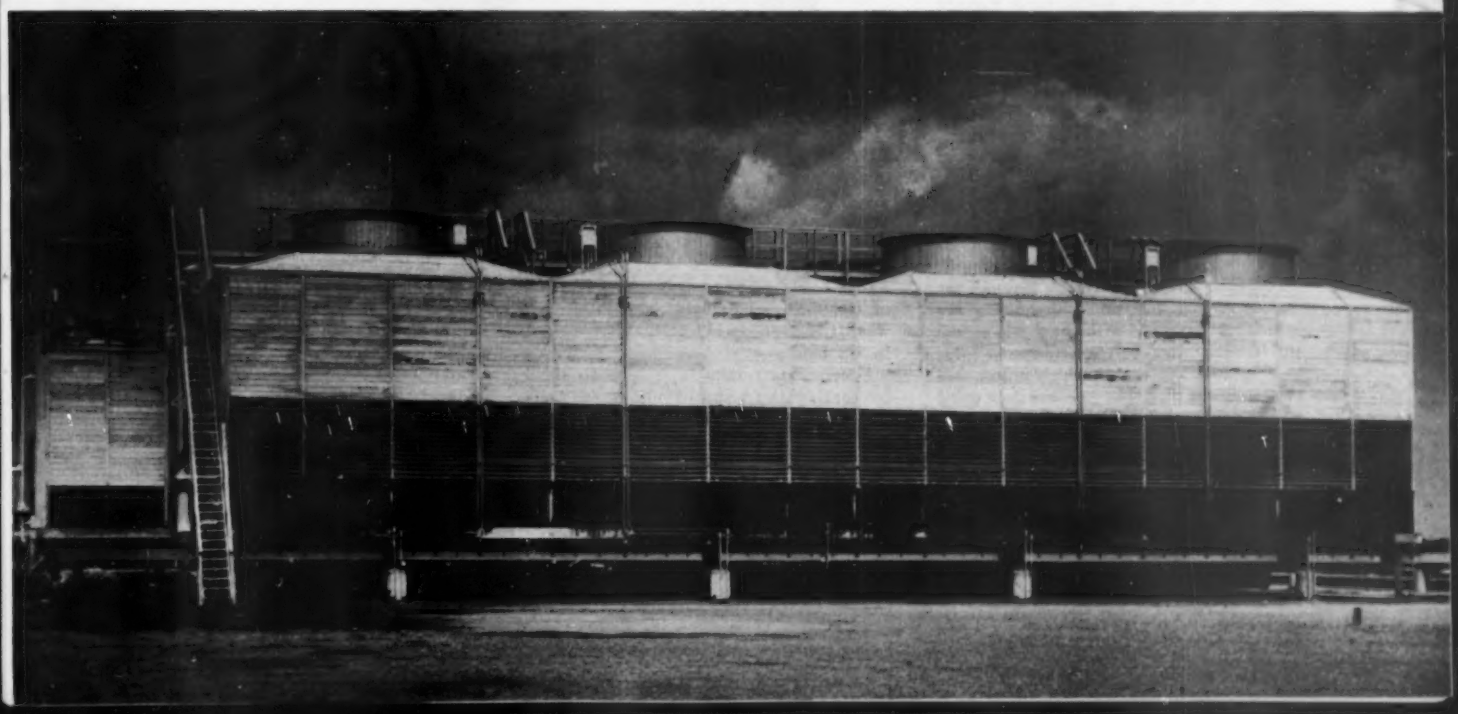
For surface preparation of sub-surface equipment, it was necessary to fasten a metal cofferdam about the pipe and pump out water so that workmen could scrape off marine growths and old paint prior to sand-blasting and recoating with plastic. In the case of new wells drilled, it now is the practice to coat all equipment prior to installation.

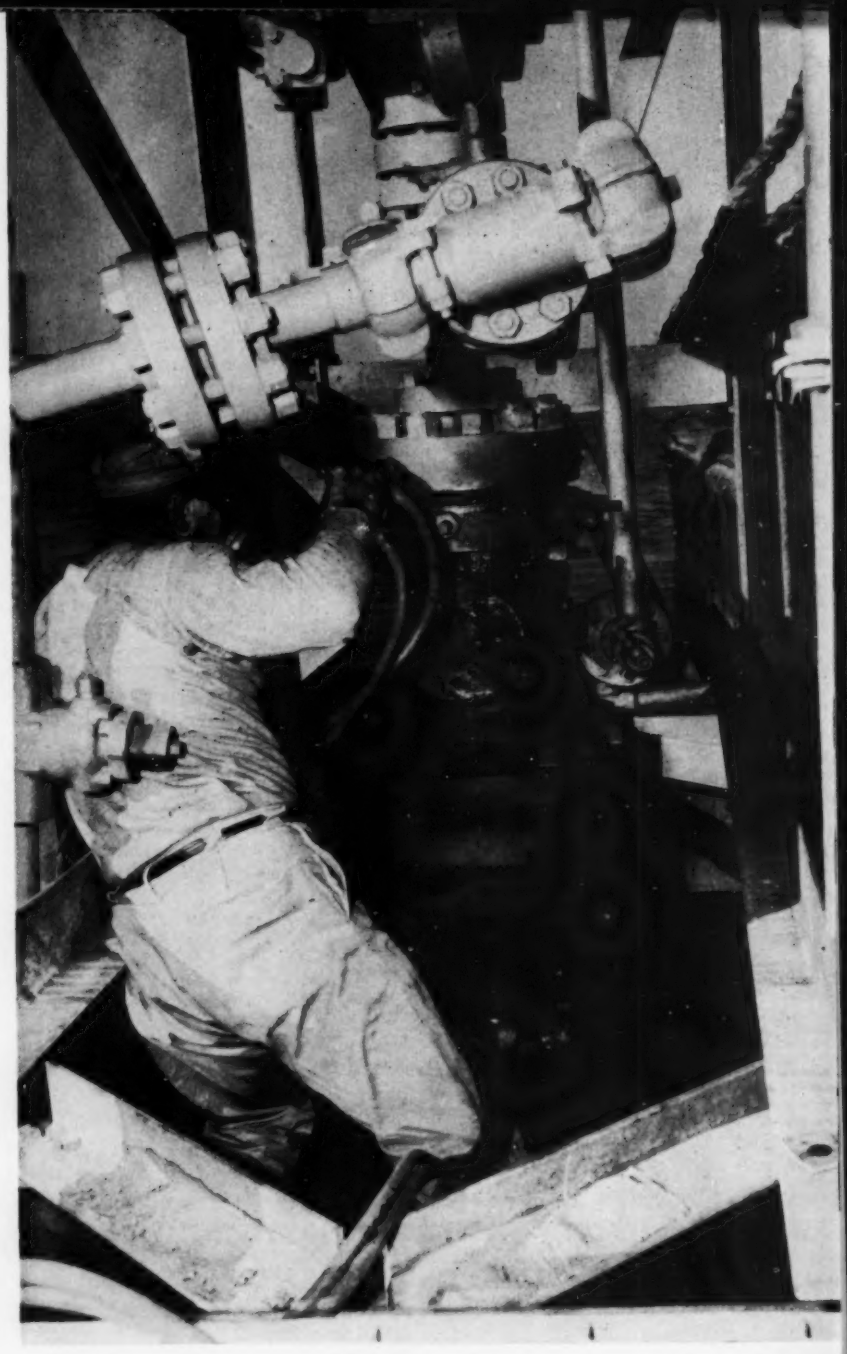
In a study of plastic coating for drill pipe, one operator conducted a test in which four strings of uncoated 5 9/16-inch diameter drill pipe were used in essentially the same type of equipment and the same general area of the Permian Basin of West Texas. Two additional strings of 5 9/16-inch drill pipe were coated and used similarly. The uncoated strings were operated at a reduced rotational speed and a reduced rate of penetration. The prescribed number of drill collars were used with each string.

It was found from this test that the life of the uncoated pipe averaged approximately 38,000 feet of hole drilled, the minimum being approximately 27,000 feet and the maximum 47,000 feet. In each case the ultimate life of the drill pipe was determined as that point where failure from corrosion fatigue was becoming so frequent it was uneconomical to continue using the string. A number of fishing jobs were required for each uncoated string. Total cost of such fishing jobs was approximately $5,000.

The coated strings were sandblasted and coated with vinyl coatings at the outset of the test. They were recoated after 30,000 feet of hole was drilled and at increments of approximately 30,000 feet thereafter. This coating interval was arbitrarily selected and could possibly have been increased to 45,000 feet. The coated strings have now drilled upwards of 120,000 feet of hole. There have been no failures which could be attributed to corro-

Cooling tower with piping and other metal parts coated with vinyl plastic to resist chemical corrosion and rust.





Applying plastic coatings to well head equipment in Galveston Bay. Coatings have given four years of satisfactory service thus far.

sion fatigue. On a dollar and cents basis, including the cost of coating, cost of inspections, salvage value of the pipe and additional tool joint inspection which was required due to the aditional life, a saving of approximately 25 percent was obtained. This does not take into consideration a saving effected by not having any fishing jobs.

Corrosion fatigue of sucker rods is very similar to the problem of corrosion fatigue in drill pipe. A number of coated strings of sucker rods have been tried in the corrosive area in Kansas. One particular installation had rod failures approximately every 30 days due to corrosion fatigue. The rods were coated in this particular well and have now been running a little over two years without a failure. This is also true of many other similar installations in that area.

Another excellent application for vinyl plastic materials is for coated tubing and lead lines to prevent paraffin deposits. One company reports that on uncoated tubing their cost was $20 per well per month in one particular area. The paraffin deposits are found in the top 1,500 feet of the tubing string and in the lead line. Since using coated tubing in the upper 1,500 feet and in the lead lines, they have had no paraffin deposits. Their cost for paraffin removal therefore has been reduced to nothing. The payout in this particular case was 13½ months.

In western Canada companies are using larger diameter lead lines than required to carry the oil due to the formation of paraffin in the lead lines. After coating with vinyl plastics, they found no paraffin was being deposited and, consequently, were able to reduce the size of their lead lines, thus effecting considerable savings.

In the sour crude area in West Texas, several companies have been successful in extending the life of pipe lines to a remarkable extent by coating the interior of the pipe with vinyl plastics. Gathering lines as small as three inches in diameter and larger lines up to 12 inches have been treated.

Through the development of special methods, Shell pipe line engineers have found it possible to clean and coat sections of line without removal from the ground. To do this, scrapers were run through the line to remove rust and subsequently the interior was cleaned with chemicals passed through the line between neoprene pigs to eliminate any sulfur which might still remain in the pipe. The line was then dried and a prime coat applied with the same method used to desulfurize the walls. A vinyl plastic coat followed the prime coat, after which the line was purged of solvent vapors and put back into service.

The line first protected by Shell was a 7,400-foot, 4-inch gathering line which had been developing about two leaks per month. Maintenance cost was running nearly $300 per month. It would have cost $9,350 to replace the line, whereas the cost of cleaning and applying plastic coating was $1,698, an operation which paid out in six months.

Spectacular results have been obtained by coating the walls of tubing in wells producing large volumes of salt water in conjunction with oil. In such wells metal loss often is very high whereas after plastic coatings are applied corrosion is halted. The same is true in salt water disposal system lines.

Lease tanks in some areas are subject to both sulfur and salt water corrosion. Most severe corrosion will be found in the bottom and approximately a foot to eighteen inches up on the shell. This is due to the salt water in the bottom of the tank; severe corrosion will of course be encountered at the interface between the water and the crude oil. The vapor area or roof of the tank is most severly attacked by hydrogen sulfide gases on the under side of the deck and a foot to eighteen inches down. Tanks coated with vinyl plastic have given excellent service for upwards of six years. Uncoated tanks in the same area and in same service have suff-

ered corrosion to the point where the steel has been completely penetrated in 18 months.

Good success in protecting large floating roof tanks with vinyl coatings has been obtained. Test tanks have been coated for more than six years without failure. Practice is to coat exterior surfaces of the tank, the floating roof and the top three feet of the tank interior which is exposed when the tank is filled.

Application of vinyl coating was made in Eastern Venezuela on housing furnished for laborers. These houses are small two-room duplexes and are constructed from native tile very similar to our red construction tile. Inasmuch as the turnover of tenants in these houses is very high, it has become a problem to maintain this type of housing. It was necessary in some cases to repaint the interiors of these houses as much as three or four times per year since the paints previously used were not washable.

Application in these houses was made by first removing the old paint on the interior which through the years had grown to considerable thickness and did not have good adhesion and was spalling and cracking off the walls. The interiors were sandblasted down to the bare tile. Following this, a wash coat of water and Portland Cement was applied to fill all voids and cracks after which two coats of Vinylite Beauty Shield were applied.

The roofs of these houses are made of corrugated sheet metal. Due to the almost vertical rays of the sun and the frequent rains, the coatings being used did not stand up particularly well. Application on the roofs was made by first sand-blasting the old coatings off and applying five coats of Liquid Plastic.

Where the exterior walls of the houses were in fair condition, application was made by merely cleaning them and applying two coats of plastic paint. This application has given good results.

A test application was made in a house located on the banks of the Orinoco River. The relative humidity is in the neighborhood of 95-96 almost the year round. Temperature, of course, is also very high. The biggest problem at this camp was with mildew, and ordinary paints would deteriorate in three months.

The house was prefabricated, having galvanized sheet metal on the exterior and masonite on the interior. Application was made by sandblasting the old coating from the exterior sheet metal and applying five coats of liquid plastic. Application on the interior was made by applying two coats of Beauty Shield. This application is also giving results.

There are a number of vinyl resins produced by plastic manufacturers. Bakelite Corp. manufactures vinylite, a copolymer of vinyl chloride and vinyl acetate. B. F. Goodrich and Dow Chemical Co. produce somewhat different resins. Generally the resins are readily formulated for brushing or spraying as paints by the use of proper solvents. When applied, the films are tough and somewhat elastic with a good resistance to abrasion and chipping as well as to oils, acids, alkalies and chemicals.

For successful application, it has been found necessary to use care in surface preparation and to use system coatings consisting of a primer, intermediates and a surface seal.

Most important of all, perhaps, is surface preparation. In a book of instructions prepared by Lloyd A. Brudvig, chief engineer of Plastic Coating Corp., Houston, methods are listed in the order of desirability:

1. Dry sand blasting at 90 to 100 psi with ¼ to ½ inch nozzles using 60-80 or 40-80 mesh sand. This should be followed by dry air blowing. If the surface still is oily, it must be cleaned with naphtha or carbon tetrachloride.

2. Wet sand blasting followed by a wash with rust inhibiting water. The type of inhibitor used is controlled by the primer coat to be applied. A final step after oil removal is wire brushing to remove loose rust.

3. Wire brushing with air or electric driven brushes. Hand brushes are permissable only where power equipment cannot be used. Brushing is followed by a rust inhibiting wash and residual oil removal.

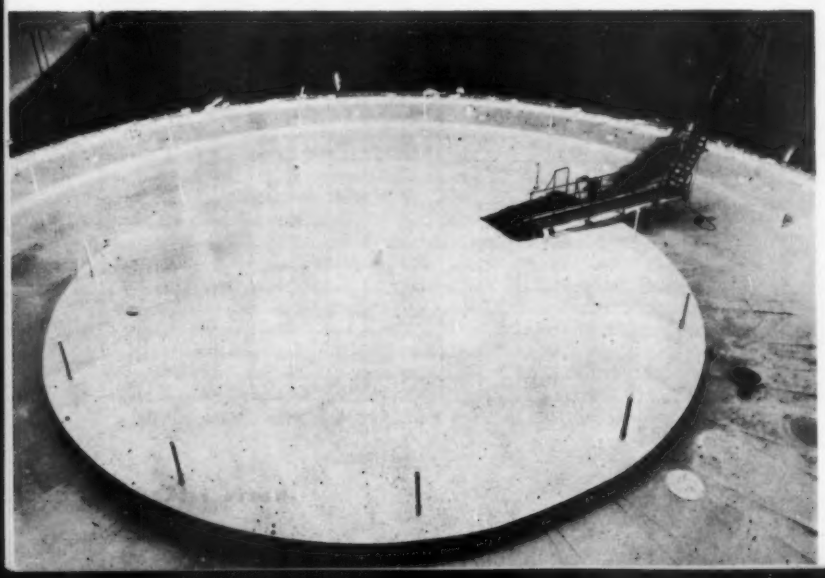
After surface preparation, priming is the next most important part of the plastic coating application procedure. Mr. Brudvig reports that co-operative research of the United States Navy and Bakelite Corp. has developed a wash primer which is an alcohol solution of polyvinyl butyral resin, pigmented with an insoluble zinc chromate—phosphoric acid being added to the primer immediately before application.

Wash primer gives good results at all atmospheric temperatures. Since it dries by the rapid evaporation of solvents, ten or fifteen minutes is sufficent drying time before the application of the regular anti-corrosive coat. It is formulated with low solids so that it will penetrate into the cavitation or corrosion pits. A film of 0.3 to 0.5 mils is adequate for good protection. A number of coating systems have been developed for differing purposes. For very severe corrosion Plastic Coating Corp. recommends two coats of anti-corrosive primer and three finish coats after the wash primer. The six-coat system is recommended for equipment exposed to strong acids and alkalis and sour crudes with sulfur content in excess of eight percent. A minimum coating of five mils is recommended.

For most corrosion protection situations a 5-coat wash primer system is recommended which is the same as the 6 coat system except that only two finish coats are required, and the minimum coating should be four mils.

For repair work on old coating jobs a standard, rather than a wash primer system, has been devised. Other systems are recommended for application over old oil paint-shop work, "skidless" coatings on walkways, and anti-fouling systems for marine use.

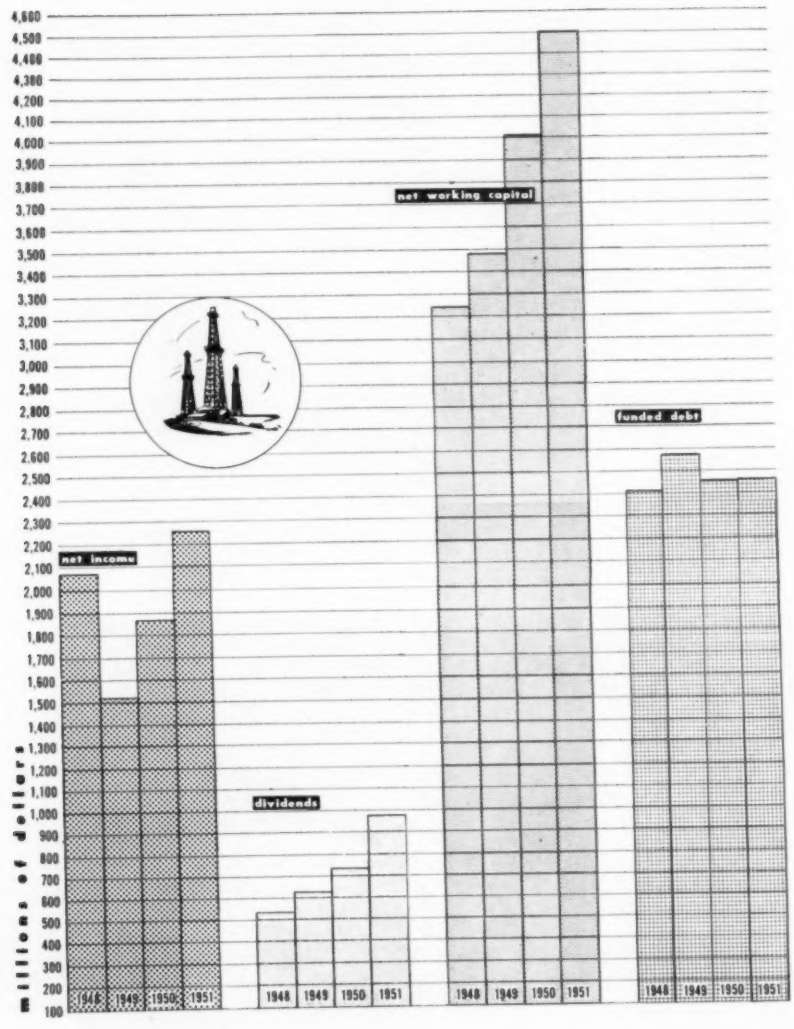
Where surfaces are properly prepared and rust, oil or sulfides are removed, the various system coatings provide a tough, highly impervious and non-reactive surface. Coatings are low in solid content and high in wetting ability, especially in the case of the primers. These tend to enter all interstices in the metal surface and to cling tightly. Subsequent coats bind successfully with lower coats to create a homogeneous coating. For an industry which suffers facility deterioration as much as does petroleum from tropical, marine and corrosive materials, the development of plastic coatings appears to be of major importance in cost control.



After six years of exposure, vinyl plastic coatings are intact on floating roof tank decks, the top three feet of interior walls, and the exterior of tanks handling sour crude.

1951 OIL PROFITS INCREASE

A complex of factors contribute to a continuing rise in oil industry profits, 1951 net income exceeding that of 1948, the previous record year.



Comparison of net working capital, funded debt, net income and dividends paid by oil companies in the past four years.

20 PERCENT OVER 1950

A SURVEY of the 1951 financial statements of 30 leading United States oil companies reveals a 20 percent increase in net income over the previous year, thus continuing the trend begun in 1950, when earnings for these same companies rose 23 percent over 1949.

This rise reflects not only the demands of the Korean conflict and of European recovery, but also the American oil industry's response to the challenge presented to suppliers of the world's markets by the Iranian shutdown, for although imports of both crude and products remained relatively close to 1950 totals, exports of products rose 70 percent over 1950. Other factors contributing to substantial increases in production and refining facilities are increasing general consumption rates in both the eastern and western hemispheres which may, particularly in the case of underdeveloped nations, be expected to continue for some time into the future.

Domestic demand for gasoline in 1951 rose more than eight percent for the second consecutive year, according to American Petroleum Institute reports, reaching a total of 43,888,727,000 gallons, over three billion gallons above the 1950 figure. Coincident with this rise in gasoline consumption was a 6.3 percent rise during 1951 in automobile registrations and a 5.9 percent rise for trucks and buses.

In expectation of the continuation of such demands, both domestically and abroad, plans for expansion in all phases of the industry are causing large sums to be set aside by many companies. P. C. Spencer, president of Sinclair Oil Corp., in his message to that company's stockholders and employees, said that "Notwithstanding the fact that the uncertainties to be faced, including the possibility of increased taxes and more inflation, demand an unusual amount of caution in administering . . . affairs, they should not . . . serve to delay or forestall proper planning for the . . . future—in fact they make such forward planning more imperative. During the 'thirties it was the vogue in some quarters to hold that our economy was "mature"—that it had reached its productive limits. How wrong that was has been demonstrated over and over again. And our economy still has not come even close to its productive limits. Given a favorable economic and political climate, greater and greater growth in our industrial enterprise seems definitely assured for the future."

These large cash requirements are being carried largely by current earnings, as evidenced by the fact that the funded debt total for the 30 companies included in this survey has increased only ⅓ of one percent over 1950 ($2,557,699,115 in 1950, $2,567,574,533 in 1951), while net working capital and net capital assets have increased 12 percent and 9 percent respectively.

All except two companies, Continental Oil Co. and Lion Oil Co., showed increases in net income over 1950, the total for the 30 companies being $2,268,183,560 as against $1,877,667,352 for 1950. These same figures, on a per share common basis, may be reduced to $7.23 for 1950 and $6.51 for 1951. The apparent decrease in 1951 is explained by the 38 percent increase (from 251,187,244 in 1950 to 346,593,874 in 1951) in the number of common shares outstanding. Eight companies, Amerada, Continental, Gulf, Humble, Phillips, Plymouth, Standard of New Jersey, and Texas Co., increased outstanding common figures by two-for-one share splits, Pacific Western increasing its shares from 1,374,007 to 4,534,224.

Funded debt figures remained in general constant, with few increases, while reductions were made by Gulf, Humble, Imperial, Pacific Western, Phillips, Plymouth, Pure, Skelly, Socony-Vacuum, Standard of California, Standard of Indiana, Standard of New Jersey, Sun, and Texas Gulf.

Seven of the companies reported net earning in excess of $100,000,000, the same number as in that category last year, their group income of $1,464,496,496 making up 64 percent of the total reported for all 30. The $2,268,183,560 1951 net income total for the 30 companies is 20 percent above the 1950 figure of $1,877,667,352, and some 9 percent above the previous record total of $2,075,564,000 for 1948. Largest gain over 1950 income was reported by Standard of N. J. and affiliates, $120,237,556; with other large gains by Gulf, $28,931,395; Phillips, $22,153,965; Socony-Vacuum, $33,405,317; Standard of California, $22,537,106; Standard of Indiana, $25,115,879; and the Texas Co., $29,702,934. Only two companies, Continental Oil Co. and Lion Oil Co., showed a decrease in earnings from 1950.

The 12 percent improvement in the working capital position of the companies was participated in by all companies except Continental, Humble, Phillips, Sunray, and Union Oil of California, the largest decrease shown, $18,280,362, being for Continental. Total for all companies for the year was $4,506,783,618, as against $4,020,069,150 for 1950. Largest increase was shown by Standard of N. J. at $159,383,084, and other substantial increases were made by Gulf, $70,097,489; Sinclair, $34,814,964; Socony-Vacuum, $34,133,881; Standard of California, $42,541,090; and the Texas Co., $39,417,862.

Cash dividends were distributed by the 30 companies in the amount of $981,737,813, approximately 43 percent of total net income for the year. This compares with approximately 40 percent paid by the same companies for the year 1950. Largest payment was made by Standard of N. J., $249,599,000. Other large distributions were made by the Texas Co., $83,934,415; Standard of California, $74,532,059; Shell, $40,412,000; Standard of Indiana, $45,000,000; Socony-Vacuum, $57,243,384; Phillips, $31,521,777; and Gulf, $45,381,000.

The tabulation on the following two pages shows net income, per share earnings on common stock outstanding, net working capital, and other pertinent facts on the 30 American oil companies for the year 1951 compared with three previous years, and includes figures for two foreign affiliates of Standard Oil of N. J. (Creole Petroleum Corp. and Imperial Oil Ltd.)

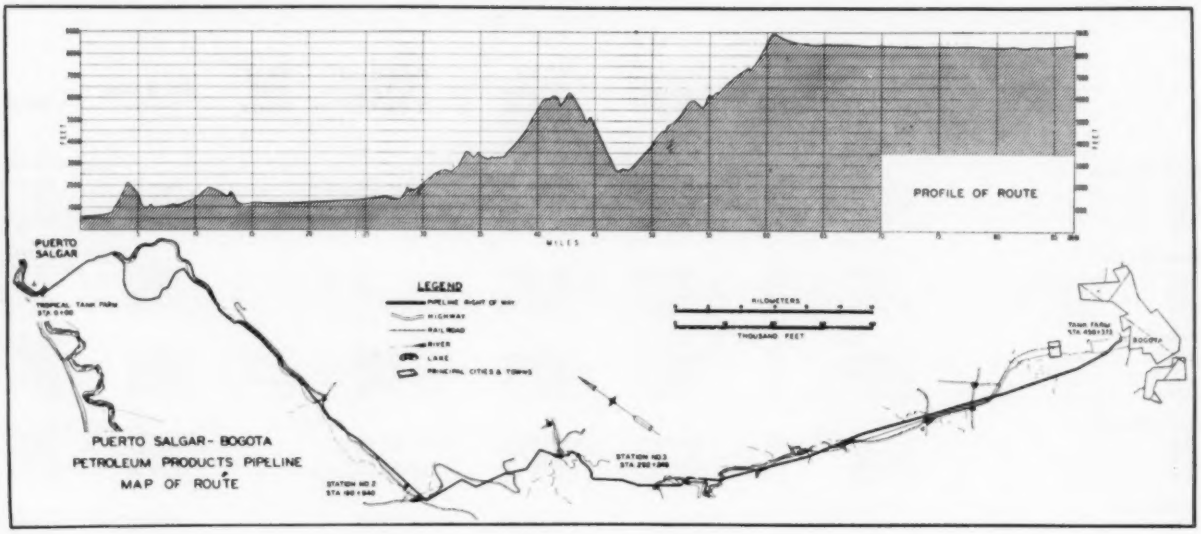
FOUR YEARS FINANCIAL REVIEW OF

		Net Income	Per Share of Com.	Net Working Capital	Net Capital Assets	Funded and or Long Term Debt	No. of Pref. Shares	No. of Com. Shares	Surplus
Amerada Corp.									
	1951	$16,296,652	$5.17	$27,083,318	$48,083,598	.....	..... (H)	3,154,700	$73,554,485
	1950	15,399,607	9.75	24,062,549	43,941,394	.....	.....	1,577,350	57,257,833
	1949	14,384,193	9.12	21,343,683	40,883,360	.....	.....	1,577,350	51,822,326
	1948	22,642,282	14.35	23,503,669	32,131,671	.....	.....	1,577,350	44,824,883
Atlantic Refining Co.									
	1951	45,067,298	12.20	71,549,052	315,964,506	$37,479,000	352,000	3,584,791	232,061,880
	1950	40,841,508	13.09	65,979,784	278,356,802	33,120,557	352,000	2,987,326	202,651,286
	1949	27,210,432	9.51	54,697,673	271,811,844	34,534,054	477,980	2,660,911	179,954,862
	1948	35,657,124	12.68	49,636,811	251,779,652	27,890,000	499,980	2,660,911	169,978,172
Cities Service									
	1951	57,177,000	14.71	201,935,592	620,628,334	363,053,822	.....	3,889,077	374,588,947
	1950	56,659,025	14.57	182,898,128	590,717,688	354,844,281	.....	3,889,077 (C)	338,296,843
	1949	55,057,822	14.16	180,542,106	612,656,328	423,944,945	.....	3,702,000 (A)	290,366,048
	1948	66,777,039	17.17	161,267,620	657,955,713	512,082,756	.....	3,702,000	221,112,982
Continental Oil Co.									
	1951	41,292,692	4.25	50,917,770	189,849,331	348,697	..... (H)	9,716,916	215,115,907
	1950	42,406,666	8.73	69,198,132	156,478,852	400,869	.....	4,858,458	221,926,717
	1949	36,096,880	7.48	57,100,861	152,660,205	1,427,783	.....	4,823,858	202,397,966
	1948	54,216,729	11.24	59,351,453	136,635,762	1,475,475	.....	4,823,458	185,594,215
Creole Petroleum Corp.									
	1951	202,278,300	7.82	172,820,500	473,058,000	.....	.....	25,865,310	351,318,113
	1950	166,930,337	6.45	107,225,478	473,899,905	.....	.....	25,865,310	297,765,346
	1949	116,149,079	4.49	7,749,771	491,112,483	.....	.....	25,865,310	218,777,068
	1948	198,655,825	7.68	19,077,963	440,614,942	.....	.....	25,873,510	205,520,639
Gulf Oil Co.									
	1951	140,071,000	6.17	325,725,000	785,045,048	185,023,669	..... (H)	22,696,500	424,815,861
	1950	111,139,605	9.80	255,627,511	708,965,875	185,301,460	.....	11,345,250	614,967,783
	1949	100,877,041	8.89	205,847,853	698,395,698	189,969,415	.....	11,345,250	548,839,178
	1948	153,539,299	13.53	213,456,462	661,757,676	184,874,046	.....	11,345,250	482,097,887
Houston Oil Co.									
	1951	7,053,640	6.42	6,683,530	54,500,464	11,900,000	.....	1,100,000	22,648,331
	1950 (C)	6,103,702	5.56	6,431,291	46,708,493	8,300,000	.....	1,100,000	18,341,236
	1949	5,786,727	5.26	6,927,688	44,368,994	8,700,000	.....	1,100,000	21,536,279
	1948	6,092,536	5.53	5,927,654	42,689,507	9,100,000	.....	1,100,000	18,496,098
Humble Oil & Refining Co.									
	1951	169,486,626	4.72	143,316,000	770,576,613	55,367,220	..... (H)	35,878,036	393,473,076
	1950	129,359,991	7.20	152,914,043	679,566,241	57,764,972	.....	17,975,680	304,854,492
	1949	120,479,526	6.70	138,187,401	631,071,368	56,534,013	.....	17,975,680	247,397,221
	1948	186,068,579	10.35	159,083,661	560,663,995	49,491,900	.....	17,975,680 (B)	198,820,415
Imperial Oil, Ltd.									
	1951	35,951,153	1.20	217,608,973	209,593,207	55,808,725	.....	29,847,227	204,340,216
	1950	30,460,567	1.12 (C)	163,857,007	170,770,889	58,262,591	.....	27,133,843	176,024,862
	1949	23,932,985	.88	150,550,513	142,778,195	59,457,401	.....	27,133,463	159,769,158
	1948	22,832,070	.84	110,575,191	96,938,105	30,000,000	.....	27,121,405	133,829,490
Lion Oil									
	1951	11,751,026	4.37	25,517,316	67,436,908	25,000,000	.....	2,690,861	45,397,453
	1950	13,988,245	5.98	14,654,736	58,582,040	25,000,000	.....	2,340,833	38,503,127
	1949	9,115,161	3.89	13,522,145	50,527,225	25,000,000	.....	2,340,813	28,903,938
	1948	11,722,432	5.01	16,816,285	38,091,088	20,000,000	.....	2,340,813	23,299,943
Mid-Continent Petroleum Corp.									
	1951	17,062,182	9.18	57,616,427	81,715,752	.....	.....	1,857,912	117,493,268
	1950	15,662,632	8.43	52,069,834	76,822,095	.....	.....	1,857,912	108,299,666
	1949	12,080,615	6.50	46,504,343	73,068,253	.....	.....	1,857,912	93,815,089
	1948	24,681,992	13.28	47,819,261	65,371,738	.....	.....	1,857,912	89,219,111
Ohio Oil Co.									
	1951	41,681,663	6.35	64,959,362	146,012,407	.....	.....	6,563,377	135,271,032
	1950	37,349,903	5.69	57,483,269	134,269,828	.....	.....	6,563,377	113,279,498
	1949	33,658,767	5.13	52,084,439	121,033,046	.....	.....	6,563,377	93,658,707
	1948	49,333,158	7.52	44,052,972	111,454,130	.....	.....	6,563,377	75,087,696
Pacific Western Oil Co.									
	1951	7,805,680 (F)	1.60	7,650,669	23,323,507	14,700,000	1,374,007	4,534,224	23,967,169
	1950	5,863,638	4.27	4,054,653	19,607,952	15,000,000	1,353,607	1,374,007	21,208,985
	1949	4,973,830	3.62	2,013,861	19,407,521	15,000,000	.....	1,374,007	29,685,415
	1948	7,305,434	5.32	2,575,785	18,333,678	.....	.....	1,374,007	24,592,481
Phillips Petroleum Co.									
	1951	73,711,229	5.45	86,117,589	562,276,683	92,622,983	..... (H)	14,423,139	279,642,231
	1950	51,557,264	8.51	93,689,850	465,758,945	123,837,693	.....	6,084,968	237,452,779
	1949	44,514,371	7.36	87,299,342	429,938,398	111,719,146	.....	6,0 '8,869	211,729,714
	1948	72,630,997	12.01	72,811,160	396,575,350	99,793,245	.....	6,046,917	179,240,920
Plymouth Oil									
	1951	10,295,791	4.24	13,784,597	40,765,285	14,219,946	..... (H)	2,427,785	27,430,264
	1950	8,498,425	7.01	9,396,626	39,584,666	14,517,033	.....	1,212,683 (C)	27,182,266
	1949	6,171,587	5.12	8,429,122	35,792,395	14,701,746	.....	1,205,925	22,184,673
	1948	6,804,456	6.38	2,450,786	18,126,383	4,139,902	.....	1,032,948	13,175,597
Pure Oil Co.									
	1951	33,593,727	7.88	80,462,776	214,676,510	26,617,267	442,434	3,982,031	186,356,227
	1950	30,329,054	7.06	67,253,125	207,241,213	27,671,066	442,434	3,982,031	164,927,609
	1949	26,977,116	6.22	58,433,570	196,085,492	28,366,321	442,434	3,982,031	144,025,697
	1948	41,672,136	9.91	57,696,334	181,984,681	30,665,823	442,434	3,982,031	127,223,018

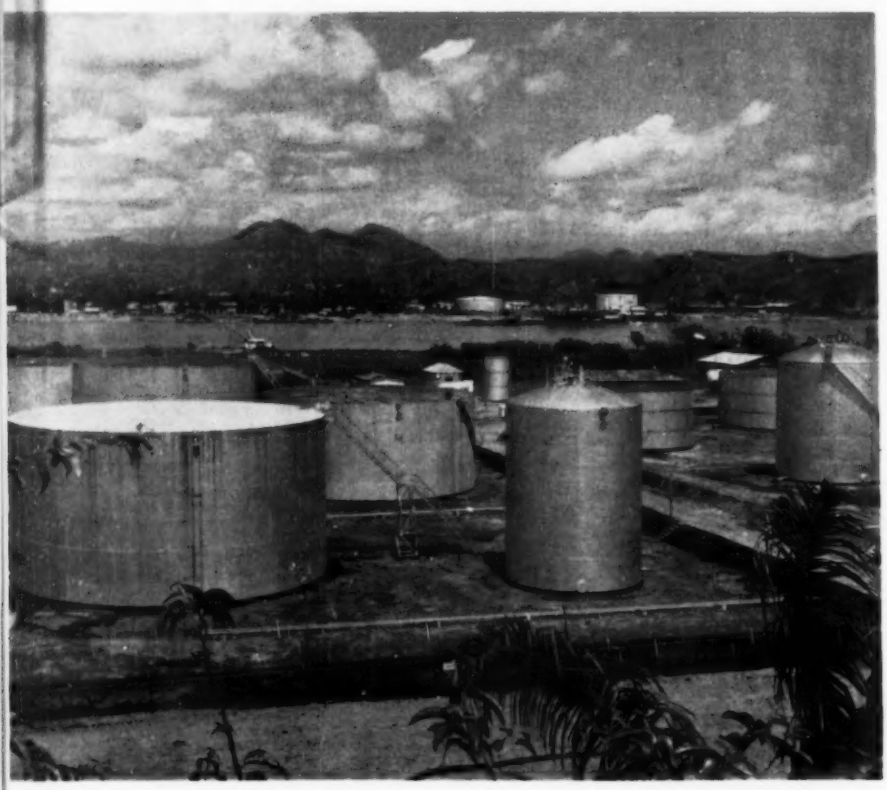
UNITED STATES OIL COMPANIES

	Net Income	Per Share of Com.	Net Working Capital	Net Capital Assets	Funded and or Long Term Debt	No. of Pref. Shares	No. of Com. Shares	Surplus
Richfield Oil Corp.								
1951	$28,218,281	$7.05	$61,685,893	$119,596,048	$50,000,000	.....	4,000,000	$63,029,502
1950	23,046,378	5.76	59,536,033	108,406,789	50,000,000	.....	4,000,000	48,811,221
1949	20,434,099	5.11	64,663,772	92,927,181	50,000,000	.....	4,000,000	37,764,842
1948	16,751,475	4.19	48,856,017	72,552,382	25,000,000	.....	4,000,000	27,330,743
Seaboard Oil Co.								
1951	6,425,299	5.26	10,780,543	22,175,244	.....	.....	1,226,613	(I) 12,928,890
1950	6,106,621	4.99	9,427,656	17,892,426	.....	.....	1,223,123	24,799,775
1949	5,781,347	4.71	9,512,775	13,988,138	.....	.....	1,226,730	21,876,673
1948	6,780,713	5.52	8,290,539	13,028,979	.....	.....	1,228,390	18,548,772
Shell Oil Co.								
1951	97,020,194	7.20	203,581,838	429,613,053	117,307,000	.....	13,470,625	329,983,590
1950	(C) 94,185,726	6.99	189,918,129	396,068,722	117,307,000	.....	13,470,625	273,375,271
1949	76,422,775	5.67	146,408,432	343,926,204	120,672,000	.....	13,470,625	211,815,030
1948	111,396,447	8.27	128,595,023	333,981,804	121,797,000	.....	13,470,625	161,846,396
Sinclair Oil Corp.								
1951	81,898,490	6.78	210,566,678	530,708,538	215,384,829	.....	12,077,604	480,029,556
1950	70,193,146	5.81	175,751,714	469,915,650	177,694,724	.....	12,077,626	422,281,866
1949	54,073,338	4.51	192,670,120	418,045,905	182,410,088	.....	11,973,984	380,968,272
1948	81,048,602	6.76	185,922,695	387,116,078	179,588,687	.....	11,974,003	350,838,098
Skelly Oil Co.								
1951	31,074,985	11.89	28,422,405	176,082,837	12,400,000	.....	2,611,872	127,239,544
1950	28,514,066 (D)	10.91	27,656,120	155,934,655	13,200,000	.....	2,611,872	104,652,744
1949	26,186,500	20.04	19,732,410	146,489,953	14,000,000	.....	1,306,134	128,190,677
1948	38,914,350	36.04	31,846,707	109,483,085	14,860,000	.....	1,079,476	111,635,500
Socony-Vacuum Oil Co., Inc.								
1951	161,622,000	5.08	348,653,000	880,791,000	169,575,000	.....	31,801,880	826,792,635
1950	128,216,683	4.03	314,519,119	819,633,241	173,600,000	.....	31,801,880	691,414,860
1949	98,329,305	3.09	255,232,100	771,397,675	174,500,000	.....	31,801,880	606,122,626
1948	132,800,055	4.18	270,386,514	732,890,440	185,000,000	.....	31,801,880	542,764,612
Standard Oil Co. of California								
1951	173,341,211	6.05	232,466,502	903,492,635	94,501,727	.....	28,673,192	711,735,471
1950	150,804,105	5.26	189,925,412	852,475,966	95,210,531	.....	28,673,192	612,926,319
1949	(C) 136,017,835	10.10	237,858,559	772,735,397	140,235,048	.....	13,654,150	543,742,703
1948	161,491,932	12.42	171,851,490	689,503,058	107,217,702	.....	13,654,150	467,365,679
Standard Oil Co. of Indiana								
1951	148,697,356	9.71	323,485,854	1,137,879,551	250,350,978	.....	15,320,249	888,585,192
1950	123,581,477	8.09	304,757,868	1,049,056,793	261,620,025	.....	15,284,772	783,598,396
1949	102,668,228	6.72	269,263,654	1,022,452,070	286,946,517	.....	15,284,772	701,223,890
1948	140,079,286	9.16	197,519,086	975,759,328	249,464,586	.....	15,284,793	636,601,618
Standard Oil Co. (N. J.)								
1951	528,460,779	8.72	1,206,514,211	2,272,915,854	440,973,256	.....	(H) 60,571,092	1,957,718,665
1950	408,223,223	13.48	1,047,131,127	2,125,404,704	441,024,197	.....	30,285,546	1,830,374,554
1949	268,869,501	8.91	847,264,604	2,085,721,726	475,710,293	.....	30,183,394	1,572,656,868
1948	365,604,976	12.44	659,838,746	1,858,675,283	230,426,922	.....	29,385,435	1,436,465,470
Standard Oil Co. of Ohio								
1951	23,164,581	5.56	71,530,669	155,403,855	38,368,393	236,922	4,010,067	132,627,644
1950	20,221,345	5.30	62,847,977	136,023,718	37,089,265	242,294	3,642,720	108,321,581
1949	16,142,164	4.26	58,321,473	128,821,813	36,543,089	247,900	3,574,371	96,963,686
1948	23,783,197	6.39	67,189,650	112,937,258	36,694,040	248,550	3,572,693	88,826,256
Sun Oil Co.								
1951	45,353,643	6.85	93,362,290	219,918,557	6,880,000	93,197	6,564,231	(E) 60,723,474
1950	36,291,498	6.02	78,215,269	197,626,162	7,690,000	93,197	5,967,624	(E) 57,602,416
1949	25,177,875	4.57	56,270,746	183,879,729	6,000,000	93,197	5,427,483	(E) 52,254,581
1948	42,858,839	8.61	56,413,048	159,135,242	829,494	93,197	4,934,257	(E) 57,092,279
Sunray Oil Co.								
1951	24,282,516	2.23	32,375,633	221,819,411	78,000,000	1,682,038	9,966,400	131,954,070
1950	20,462,878	2.97	33,528,394	212,136,101	78,000,000	2,784,569	8,455,352	99,596,608
1949	10,846,070	1.77	19,342,939	99,112,866	26,000,000	1,751,227	5,052,143	20,237,090
1948	15,644,234	2.78	24,815,882	93,912,442	30,060,000	1,784,787	5,050,182	20,033,762
The Texas Co.								
1951	178,774,677	6.50	385,699,764	844,195,788	180,252,197	.....	(H) 27,510,692	534,835,564
1950	149,071,743	10.82	346,281,902	789,034,178	178,805,442	.....	13,774,881	784,935,922
1949	132,748,159	9.62	321,188,140	742,055,255	180,125,177	.....	13,787,624	686,659,536
1948	165,980,980	12.03	357,156,851	623,009,802	164,208,610	.....	13,797,624	609,058,895
Texas Gulf Producing Co.								
1951	3,152,765	2.85	2,564,015	17,891,756	2,350,000	.....	1,097,928	6,959,220
1950	(C) 3,047,506	2.75	1,973,265	16,896,660	2,400,000	.....	1,106,000	5,338,482
1949	3,381,359	3.13	2,125,816	16,392,892	4,000,000	.....	1,080,707	2,892,876
1948	3,830,645	3.72	2,063,854	15,017,379	5,000,000	.....	1,029,771	11,000,788
Tide Water Associated Oil Co.								
1951	37,060,606	5.79	81,733,790	179,597,757	.....	.....	6,396,809	213,399,338
1950	33,364,115	5.17	65,250,178	176,299,743	.....	.....	6,396,809	196,091,871
1949	27,518,705	4.20	62,886,797	176,302,398	.....	172,135	6,396,809	167,962,298
1948	39,387,374	6.04	54,708,056	168,523,625	.....	190,480	6,396,809	151,449,858
Union Oil Co. of California								
1951	27,295,971	5.01	50,101,535	280,666,765	84,906,549	242,500	5,266,270	95,073,897
1950	17,177,547	3.09	57,635,576	254,560,960	79,400,000	245,000	5,266,270	79,222,185
1949	20,356,946	3.69	58,676,963	249,372,269	79,700,000	247,500	5,266,270	82,192,931
1948	31,293,147	6.51	49,727,187	194,561,941	54,400,000	250,000	4,666,270	69,947,452

(A) Includes profit of $27,170,682 on sale of investments. (B) After transfer of $175,000,000 to capital stock account. (C) Adjusted by company. (D) Stated on basis of new capitalization. (E) After deductions for stock dividends. (F) Restated on basis of 4,534,224 shares of common outstanding 12/31/51. (G) Giving effect to Barnsdall Oil Co. merger in 1950. (H) By two for one stock split. (I) After transfer of $13,870,884 to capital stock account.



Colombian Products Line in Operation



View of Esso tank farm at Puerto Salgar looking west across the Magdalena River to La Dorada.

COLOMBIA'S first products pipe line, from Puerto Salgar to Bogota, was placed in operation early in May and now is pumping gasoline, kerosine and diesel fuel up the steep mountain slopes from the Magdalena river to the nation's capital. The line is one of a group of five which Colombia expects to operate for the distribution of refined products over difficult terrain.

Delivery of refined products from point of manufacture on the Magdalena river to principal consuming areas has been difficult and expensive because of the series of lofty mountain ranges which are a feature of the Colombia terrain. Both motor roads and railroads are expensive to build and to maintain over the mountains and traffic is hampered at certain seasons of the year by torrential rains. Railroads in Colombia have not been developed as rapidly as the population and general economy with the result that the lines are over-burdened with traffic.

Present policy of the Colombian Government is to develop a series of products lines from ports on the navigable Mag-

Portion of Puerto Salgar-Bogota products line mid-way between pump stations No. 2 and No. 3.

Unloading construction equipment at Puerto Salgar after being barged up the Magdalena River from Barranquilla.

dalena to heavily populated consuming centers such as Bogota, Medellin, Manizales, and Cali. Since transportation is a state monopoly in Colombia, the lines are being financed and built by the governments of individual departments. In addition to the Bogota line which now is operating, the line from Puerto Berrio to Medellin is under construction. This latter line will parallel the railroad and be laid through railroad tunnels at some points with a consequent saving in construction cost. Other projected lines are not yet under contract.

For the present, the Magdalena river will be used to transport products from the Expressa Colombiana de Petroleo refinery at Barranca Bermeja to the Puerto Salgar terminal of the Bogota line. When the Puerto Berrio-Medellin line is completed, a similar policy will be followed. Eventually, it is planned to parallel the river with a pipe line from the government refinery to various points from which laterals are laid across the mountains. First such Magdalena valley line will be a 93-mile line from Barranca-Bermeja to Puerto Salgar. This may be laid later this year.

The Bogota line, built by Williams Brothers Corp. for the Department of Cundinamarca, consists of 87 miles of 6 5/6-inch pipe with ¼-inch wall rising from an elevation of about 600 feet on the river over a 9,000-foot peak and across the high plateau to Bogota.

Three pump stations have been built. First is at Puerto Salgar and the remaining two at points suitable for pumping products up the steep mountain slopes. Aldrich pumps are driven by Caterpillar power units to create a station discharge pressure of 1,200 psi. At this pressure, the line will have a capacity of 8,000 b/d.

Of the 87 miles, approximately 62 miles is laid on top of the ground and painted with cold aluminum paint. The remaining 25 miles, which goes through an agricultural district, is buried and given a protective coating of enamel and 15-pound asbestos felt. Incidentally, this buried portion is in the 25 miles extending out from Bogota, which as may be seen from the profile, is a fairly flat savannah where much of the agricultural activity of Colombia is located.

Each station will have a 2,000 barrel tank installed to be used for operations, but the pipe line system does not include any storage facilities, either at the origin or at the terminal. These storage facilities are being provided by the shippers. The products to be transported will be metered into the pipe line and out of the pipe line.

The $4 million line is to be operated by Williams Brothers for a four-year period under government contract. During this period the contractor will train Colombian personnel in the techniques of pipe line operation and management.

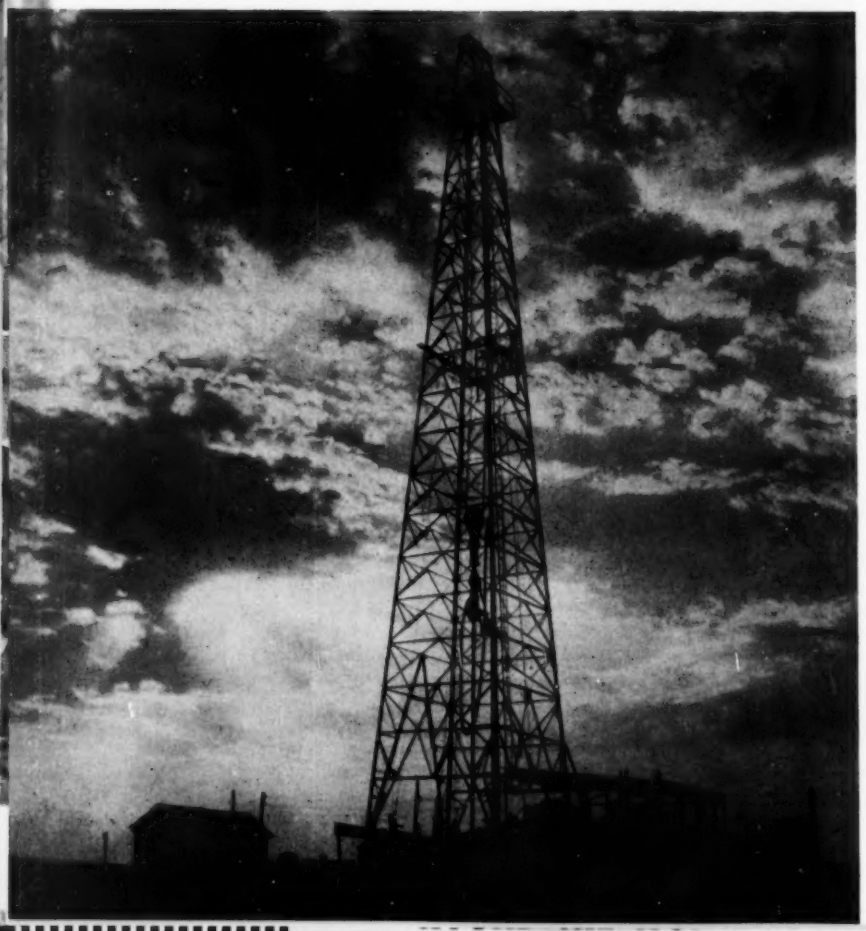
The Department of Cundinamarca was assisted in financing construction of the line by loans from International Petroleum Co. of Colombia which put up about $2,400,000, and from the Colombian government's stabilization fund which advanced $800,000. Profits from line operation are to be used to repay the building costs before the Department government participates in earnings.

The recent cost of shipping products by rail and truck to Bogota has been about 4.4 cents per gallon,, or $1.87 per barrel for 87 miles, which illustrates the difficulties imposed by the terrain. Governor Carrizosa has recommended a pipe line tariff of 3.26 cents per gallon with the hope of amortizing the line in about four years. Manager L. E. Sardi of the Expressa Colombiana de Petroleo recently made a talk over the radio in which he suggested that all of the department pipe lines be consolidated under one management and that tariffs be kept low. He suggested a rate of 1.25 cents per gallon on the Puerto Salgar-Bogota line, less than half the Carrizosa proposal. The Sardi theory is that a low rate and longer amortization period will make products available at lower prices immediately rather than after a delay of four years.

IRAN OIL COMPANY EXPLORING EIGHT AREAS IN PERSIA

BY ALFRED M. STAHMER

Well Alborz No. 1, near Qum.



WHILE the discussions around the British Iranian oil conflict have had and still have world-wide publicity, little is known about the activities of the Iran Oil Co. in eight areas outside the old Anglo-Iranian concession. The Iran Oil Co. has nothing to do with the National Iranian Oil Co., the organization which succeeded the Anglo-Iranian in Southern Persia as *de facto* owners of the Abadan refinery and the oil fields and other facilities at the foothills of the Zagros Mountains. The foundation of the Iran Oil Co. was an act which was not directed against British assets, but against Soviet-Russian claims.

After the end of the last war, the Russians had forced the Persian government to give them a promise regarding the oil concession in Northern Persia. Later on, the Government in Teheran declared that it was not willing to grant this concession because the country had previously consented under pressure. On October 22, 1949, the Iranian Parliament (Majlis) passed a single-article resolution, rejecting the proposal for the Russian concession and at the same time stipulating that "the Government must make available means for the exploration of petroleum resources of the country so that within a period of five years complete surveys of oil possibilities are made." In line with this general policy and after a comprehensive review of the situation, Teheran organized the Iran Oil Co. with an initial capital of 150 million Rials (about $4,700,000), to be increased to 1,000 million Rials whenever necessary.

The new company is totally owned by the Iranian Government. The executive board of the enterprise is comprised of a managing director (F. Naficy) and two executive directors (B. Mostofi and Dr. M. Keyhan). The task of the Iran Oil Co. consists of conducting economic surveys, as was indicated in the bill, geological and geophysical exploratory work, and drilling for and developing products such as oil and gas which might become available through these exploratory activities.

The actual field operations of the Iran Oil Co., which had to cover practically all the country outside the former Anglo-Iranian concession, were started late in 1949 and have been carried out continuously ever since. After some preliminary regional geological reconnaissance, some 800,000 square kilometers of sedimentary area which might be oil bearing was selected for surface exploration. This area was conveniently divided into eight regions as follows:

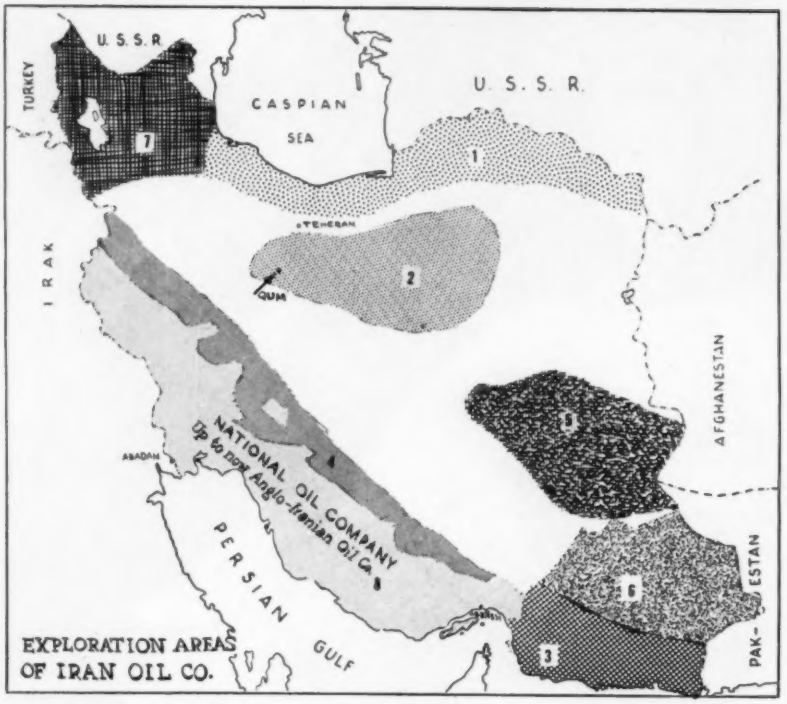
(1) Northern Khorasan, Gorgan, Mazanderan and Gilan, a narrow district between the Elburs Mountains and the Caspian Sea and along the north-eastern border with Soviet-Russia;

(2) The Qum and Semnan areas and the Dasht-i-Kavir desert, immediately south and southeast of the capital, Teheran;

(3) Coastal Makran, the southernmost

Geologist examines heavy oil seep near Qum.

Geological reconnaissance in Baluchistan.



Map showing eight likely oil-bearing areas selected by Iran Oil Co. for surface exploration.

Spudding Elburz No. 1, near Qum.

part of Iran, a coastal region next to the AIOC concession area up to the Pakistan border;

(4) The Bachtiari country and the northern part of the province of Fars, a narrow area running parallel to the northern border of the AIOC concession from Khermanshah to the south;

(5) Seistan and the Dasht-i-Lut desert north and east of Kherman town;

(6) Landward Makran (Baluchistan) between the areas (3) and (5);

(7) Azerbaidjan, the northern province bordering Turkey and the Russian Caucasus; and

(8) The continental shelf and territorial waters of the Persian Gulf and Sea of Oman.

Thus far a geological reconnaissance of all these regions has been completed and detailed investigations have been carried out in parts of the Caspian area (Mazanderan and Gorgan), the region of Qum, and coastal Makran. Special emphasis is given to photogeological surveys which are ideal for the type of territory under investigation—generally desert or bare rocks. Time and expenses can thereby be reduced by a considerable amount.

Geophysical research work has been limited up to now to the Caspian area, where regional gravity surveys have been undertaken. Detailed geophysical investigations as well as a structural drilling campaign are planned for the same region.

Drilling operations were started in the Qum area south of Teheran in July 1951. The Qum district is situated near the industrial centers and major towns of central Iran. Therefore, it has been selected in spite of better possibilities elsewhere. Even a small oil production in the Qum region would be welcome, reducing the present relatively high costs of fuel in this area where up to now the oil products had to be supplied by transport routes 620 miles overland from the present source in southwestern Iran.

The first location, about nine miles northeast of Qum town, was based on geological detail work and photogeological investigations on the crest of a broad anticline closed in the Upper Miocene. The drilling of this first well was suspended at a total depth of 6,700 feet. Various oil shows were met and the well is making a small amount of oil and gas. In order to clarify certain tectonical problems at the north flank of the structure, a shallow core hole up to a depth of 2,300 feet was drilled and subsequently, at the southwest flank, a second deep well was spudded which by the middle of February had reached a depth of 1,100 feet.

West of Qum a second anticline structure is outlined where oil seepages have long been known. A third anticline is known east of the town.

The Iran Oil Co. has engaged a number of foreign experts and made agreements with foreign contractors. The geological department consists of eight Swiss geologists, the chief of which is Professor Heim. Geophysical surveys have been carried out by the Compagnie General de Geophysique, Paris, France, and the drilling operations have been contracted to the Drilling and Exploration Co. of Abilene, Texas, on a cost plus basis. Two rigs are in use, a National for depths up to 8,000 feet, and a portable Franks for shallow holes.

It is of special interest that the stratigraphy in the Qum area seems to be just the same as in Southern Persia: at the surface, Bachtearia conglomerate, then Fars, and below, a limestone which, just as the famous Asmari of southern Persia, is defined as Miocene. The research and drilling work hitherto done in Iran outside the old Anglo-Iranian concession area gives reason for an optimistic outlook in regard to the oil possibilities. There is reason to believe that a lot of well-closed anticlines still unexplored in the south and southeast of the country are oil bearing, and that similar structures can be developed also in the central part of Persia. North of the old Anglo-Iranian concession the Cretaceous is promising—the more so since in the Lali field, deep wells have already found oil in this formation. In the northeast, near the Caspian Sea, mud volcanoes are known with a diameter of more than 1,500 feet. Here numerous seepages also indicate a chance of finding commercial oil.

Figure 1. Logging truck in position to begin operations.

WELL LOGGING INSTRUMENTATION

BY A. A. STRIPLING*

THE TERM "well logging" is a broad one and includes any record, regardless of how obtained, that lists some characteristic of a hole bored into the earth or of formations penetrated by the hole as a function of depth. The term thus includes such widely used surveys as the sampling and examination of well cuttings, the electric log, radioactivity logging, caliper logs, temperature logs, dipmeter logs, drilling-time logs, chemical analysis of the mud stream, as well as newer methods of logging which are just emerging from the experimental stages of development. These newer methods include the magnetic susceptibility log, the total magnetic field log, two or more acoustic logs, the dielectric constant log, and a wide variety of improvements and modifications of the existing logs already mentioned. In addition, there are a number of services for drill stem testing which logically are included in a list of well logging methods, but which are not discussed in this paper.

The above list of available logs could be further expanded if one were to include the special electrode configurations available for the resistivity measurements of the electric log, the several modifications of radioactivity logging, and so on.

Almost every well drilled, even a development well in the center of known production, has one or more logs run in it. It is most important that the proper logs be run in a wildcat well, for even if it proves to be dry and is subsequently abandoned, the wildcat is a potential source of information about the subsurface in its area. It is true that most wildcats are drilled for the primary purpose of discovering new oil fields, but learning the nature of the formations below the surface is a good secondary reason for drilling because the geological information thus obtained can be very helpful in improving the probability of the next wildcat in the area becoming a producer. Good well logs may indicate that a dry wildcat is a "near miss" and help one to determine which direction to go to hit on the next location. In some cases the present day rotary bit with its circulating mud system can penetrate a stratum of oil bearing rock without any worthwhile indication of this important event coming to the surface. In such instances well logs are used to determine which zones in the well should be tested for possible production.

The oldest and most obvious method of well logging is the examination of cuttings. The driller using the old cable tool rig personally escorted the cuttings to the dump box. If he was careful and conscientious he collected samples from the first bailing after each run of the bit and labelled them as to the depth from which they came. There was always the possibility of contamination of the sample from cavings up the hole, but steps could be taken to remedy this condition. If many of the old cable tool cuttings logs are poor and inaccurate, it is largely because of a lack of interest on the part of the driller or his employer. The modern counterpart of the cable tool log is the collection and examination of rotary samples. It is much more difficult to collect representative samples from a rotary rig. There is no easy way to prevent contamination from upper beds. It is difficult to determine the exact depth from which the samples came since there is considerable lag in time between penetration of the stratum by the bit and catching the sample from the mud stream. If the mud is not functioning properly, the cuttings remain at the bottom until pulverized by the bit. However, the difficulties are not insurmountable. Even though the samples may be contaminated, a careful geologist can recognize this contaminating material and disregard it. This procedure works well in the more consolidated formations but is difficult in less consolidated formations which are predominately shales and sands. The depth of the sample may be correlated with a drilling-time log, or some marker material may be introduced into the drilling fluid to determine the round-trip time of the fluid. Since the volume of the drill stem can be accurately calculated and the volume of the mud through the pump in a given time can be gauged, it is a simple matter to calculate the downhole time and substract from the round-trip time. Pulverization of the cuttings by the grinding action of the drill string can usually be prevented by reverse circulation, a process which brings the cuttings to the surface through the drill stem with higher velocity than in the normal manner of circulation.

Once reliable samples are obtained, an experienced observer can record several important logs from their examination. A qualitative description of the porosity, permeability, and oil stain of the cuttings may be made. Fluorescence can be detected. All of this is in addition to the very detailed lithologic description which may be obtained from the cuttings. These logs may be plotted on any convenient depth scale. An interesting paper covering this subject has been written by Hills.[1]

Logs made from the examination of cores are closely akin to the sample logs, but they are usually more reliable. Measurements of permeability and porosity may be made in the laboratory with a high degree of accuracy. There is, however, an ever present danger of depth error in cores. This stems from human error in handling and boxing of the core material and the ambiguity that exists when less than one hundred per cent recovery is obtained.

Turning now to a completely different phase of well logging—one in which an investigating device is lowered into the well by means of a cable and measurements made on the formation *in situ*—one finds that the first method developed for field use is still the most widely used by far. This is the electric log which consists of a spontaneous potential (or self potential) curve and, generally, three resistivity curves. The spontaneous potential log of a borehole is a record of the electrical potential (voltage) between a moving electrode in the hole and a stationary electrode at the surface. These potential anomalies are believed to be due primarily to the electrochemical cell set up between adjacent formations and the drilling mud, and secondarily to the streaming potential associated with the filtration of the drilling fluid into a permeable zone.

*Magnolia Petroleum Company, Field Research Laboratories, Dallas, Texas.

The log usually has a base line in those portions corresponding to shale formations in the hole, with departures from this base line in the permeable zones. It is sometimes regarded as a qualitative measurement of permeability of the formations.

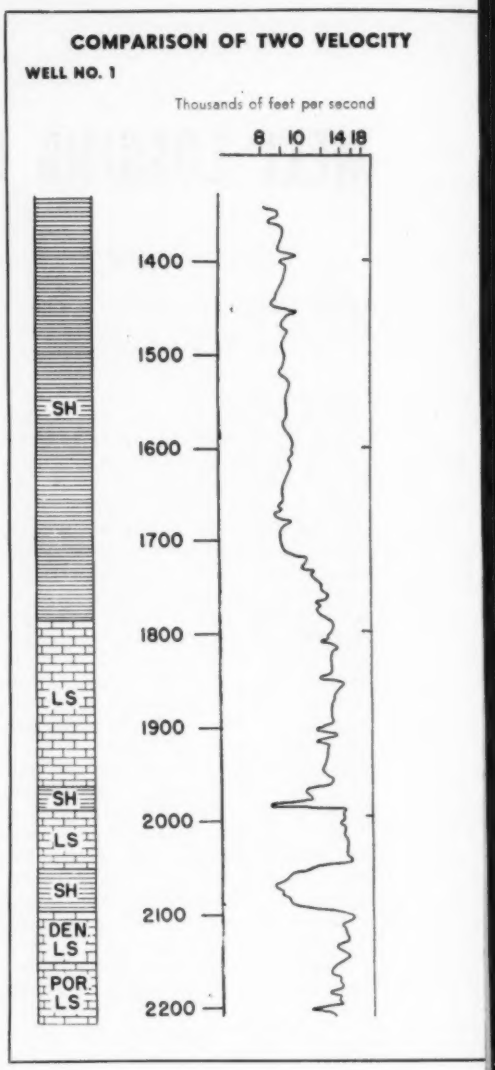
The resistivity curves of the electric log are usually made with a configuration of four electrodes. Two of these electrodes carry regulated current into the rock and two are used to measure voltage artificially created by this current. From this artificially created voltage the electrical resistance of the rock can be determined continuously as the electrode system is moved up and down the borehole. In practice, one of the electrodes is left at the surface, and the other three electrodes are attached to a weighted mandrel that is raised and lowered in the borehole. In general, when the electrodes sent down the hole are close together, the thin bed definition is good but the lateral depth of penetration into the formation is shallow. Increasing the spacing improves the depth of penetration at the expense of bed definition. For this reason a series of three different spacings or three resistivity curves is usually run. As a rule, shale has low resistivity, salt water sands are slightly higher, oil and fresh water sands are next in order of increasing resistivity, while the massive consolidated limestones are highest of all. So much work has been done on the interpretation of the electric log that it now has a wide variety of applications. These include correlation between wells, distinction between porous and permeable formations and nonporous and non-permeable formations, location of the exact depths of all formations, changes in physical characteristics of reservoirs, determination of thicknesses of formations, and fluid-content determinations. The first work on the electric log was done by C. and M. Schlumberger and E. G. Leonardon[2, 3], while much of the later work has been done by Doll, Legrand and Stratton[4], and many others.

Despite its wide range of usefulness the electric log has its limitations. Modern drilling techniques often employ oil or oil emulsion mud in the pay zones. The common electric log can not be run satisfactorily in these muds because of the high contact resistance between the electrodes and the rock. Water-base muds of high salinity and consequent low resistivity completely invalidate the SP (self-potential) log and seriously affect the resistivity curves. In sections where limestone and anhydrite are abundant, the electric log can not distinguish between them. In these beds of high resistivity the SP curve is much less effective in determining the permeable zones, nor can the resistivity curves define fluid content with accuracy. An interesting discussion of electrical well logging has been written by Guyod[6].

As a consequence of these limitations several new techniques have been devised which will be briefly mentioned. The microlog[5], which is two resistivity curves obtained with very short electrode spacings, was developed to determine more accurately the boundaries of permeable beds in limestone areas. Induction resistivity logging[7], does not require an electrolyte in the borehole since electric current is induced to flow in the rock by an energized solenoid which is lowered into the borehole and thus can be run in either oil and oil emulsion muds or in open holes such as are drilled with cable tools. The guard electrode[8] arrangement for resistivity logging is a recent development which improves the resistivity log made in wells of low mud resistivity.

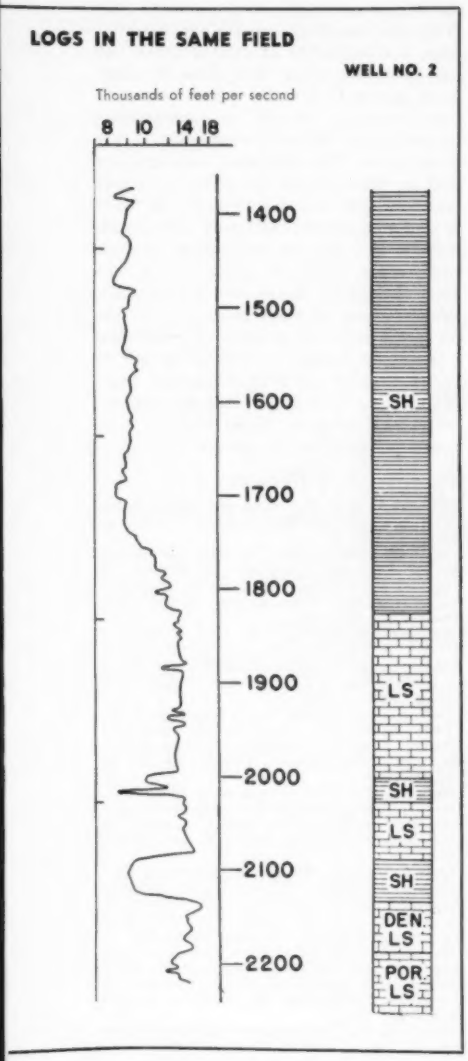
The second most widely used method of logging formations *in situ* is the radioactivity log. The standard radioactivity log has two components: (1) the gamma ray log[9], which is a measurement of the natural radioactivity of the formations, and (2) the neutron log[10], which is obtained by subjecting the formations to a bombardment of neutrons and measuring the secondary gamma ray intensity induced by this bombardment. The two logs are dissimilar. The gamma ray log can be correlated with lithology, and the neutron log can often be correlated with the fluid content of the formations and, thus, with porosity. The radioactivity survey has been used quite successfully in the study of limestone reservoirs to delineate the porous zones. However, one of the principal advantages of the radioactivity logs is the fact that it can be used to log through casing. This is of considerable convenience since it is not necessary to call the logging truck to the well just prior to the setting of every string of casing. It is also especially valuable in accurately locating a perforating gun and in working over old wells. The radioactivity log can be made in open holes whether they contain liquids or not. A disadvantage of the gamma ray log is that it does not positively identify changes in lithology since there is no hard and fast relationship betwen gamma ray activity and rock type. The neutron log does not distinguish between porous rock saturated with oil and porous rock saturated with water. Both logs are usually run at a slow rate of speed, thus requiring more rig time than does the electrical survey.

The caliper log[11] has its greatest application in determining the volume of cement to be used when cementing casing. It is a valuable tool in evaluating the effects of hole diameter changes on the other types of logging. The instrument consists of a plurality of hinged arms which press against the wall of the hole. The position of the arms is recorded continuously at the surface as the instrument is pulled out of the hole. The resulting log tells the driller the diameter of the hole at every depth. An amplified caliper log is now being evaluated in the field as a means of detecting permeable zones. Its use is based on the idea



that a mud filter cake will build up on permeable zones and reduce the diameter of the hole through these zones. The caliper log also has a variety of uses in well completion procedures where a knowledge of the diameter of the hole is necessary for the proper setting of packers, etc.

The temperature log[12] is frequently run to check the position of the top of cement behind casing. This use is based on the fact that cement releases heat in setting up. It is somewhat surprising to note that a temperature log can at times be used to log lithology through casing. This phenomenon is due to the differences in thermal conductivity of the various strata which cause different cooling rates in the drilling mud. This method is subject to several sources of error and is not widely used. Occasionally there exists a point in a well where gas is entering and expanding. This point can be located with a temperature log if the cooling effect of



the expanding gas reduces the temperature of the mud column by as much as four or five degrees.

One of the most interesting of the special logs is the combination photoclinometer and dipmeter[13] survey. This set of logs requires some rather complicated instrumentation. The photoclinometer log is designed to measure the amount and direction of deviation from vertical that the drilled hole may have. The dipmeter survey is designed to measure the dip of the formations penetrated by the hole. The measurement of deviation from the vertical is necessary to increase the accuracy of the dipmeter survey. The use of such a survey can be illustrated by supposing that a wildcat has been drilled which has a good zone of permeable and porous rock filled with salt water and only a little oil in the upper part of the zone. The next well should be drilled "up dip". If a well were drilled showing a little oil underlying a gas cap, the next well should be drilled "down dip".

Figure 1 shows a logging truck set up to log a well located in northeast Texas. In the rear section the truck has hoisting equipment and 15,000 feet of armored electrical cable. The investigating device is lowered into the well by means of this cable, and depth measurements are made by the sheave and selsyn which may be seen in position over the hole. The operator is entering the instrument compartment in the center of the truck where surface instruments and recorders are housed. The drill stem is racked up in the derrick and one of the roughnecks may be seen leaning against it. Logging time affords a period of relaxation for the drilling crew.

The logs discussed thus far have one thing in common. They are made after the well has been drilled and the drill string has been removed from the hole. For some time the need for a log to be made while drilling has been recognized. Some work has been done in an attempt to log resistivity using the bit as an electrode. This has not yet received wide acceptance because of the difficulty in electrically insulating the bit from the drill string and running an electrical conductor from the surface to the bit. The Geolograph, however, is a log made while drilling which correlates with the SP curve to a surprising degree. The Geolograph is simply an automatic recording device which logs the rate of penetration of the rotary drill bit. Its use is based on the fact that in rotary drilling under normal conditions, major changes in the rate of penetration are due to changes in the lithology or texture of the formation being drilled. If the "soft breaks" on the Geolograph record are plotted on a conventional electric log the close correlation with SP can be noted. It is evident that a reliable log while drilling would have many uses; this instrument is receiving increasing attention.

Another log which follows the bit rather closely is the chemical analysis of the mud stream. The basic idea here is that the bit penetrates formations containing gas or oil and that traces of these products necessarily exist in the mud stream. In making this log a small portion of the drilling mud is directed at the surface into a chamber where the mud is agitated in the presence of air to allow separation of the gas. A hot wire gas detector is employed which is capable of analyzing for methane. The detection of oil is more difficult and is usually done by examining the cuttings for fluorescense. Since limestones and other minerals also fluoresce, it is common practice to use a solvent, such as carbon tetrachloride, to leach the oil out of the cuttings. If the carbon tetrachloride shows fluorscence, the cuttings contained oil; if not, the fluorescence was due to some mineral.

All of the foregoing logs are commercially available and will remain so as long as an economic need for each particular log exists. The electric log (SP and resistivity) is used almost universally and leads all the others in frequency of use. However, there is no reason to believe that the measurement of the electrical properties of the rock, especially in view of the serious alteration and modification of these properties by the drilling fluid, is the best way to obtain the desired information. This is one reason why there is considerable research under way in a number of laboratories on the development of new logging instruments to measure additional rock properties.

Another incentive for the development of new logging methods is the increasing need for a better knowledge of the physical properties of the subsurface which influence the measurements made in the geophysical prospecting for petroleum. For example, a density log of the sedimentary section will aid materially in the interpretation of gravity maps; a continuous log of acoustic velocity will aid in the conversion of seismic time data to subsurface depth, and a magnetic susceptibility log will similarly aid in the interpretation of magnetometer surveys since it will reveal what geological formations are mainly responsible for the surface variations of the earth's magnetic field.

Accordingly, the wide use of the airborne magnetometer that developed after the war caused the Field Research Laboratories of the Magnolia Petroleum Company to turn some attention to the development of magnetic logs. As a result, two new logs have been developed and described in the technical literature[15]. The first of these continuously measures the magnetic susceptibility of the rock as a function of depth. Magnetic susceptibility is the property that describes the ease with which a given substance can be magnetized if placed in a magnetic field. It is not the same as remnant or permanent magnetism. In general, those formations which are high in iron compounds, especially magnetite, are high in magnetic susceptibility. To go along with the susceptibility log a second device, the total magnetic field logger, was developed. This device measures changes in the earth's magnetic field throughout the borehole, and in this case the remnant magnetism of the formations makes up a small part of these effects.

Aside from the specialized use which the magnetic susceptibility log has in magnetometer survey interpretation, there are other uses for it. It defines lithology by reason of the fact that there is a wide range in values of magnetic susceptibility in rock types. This log is an induction type device and may be used in non-conductive mud or oil, in highly conductive mud, or in open hole with no liquid. In the development of this log it became necessary to separate the effects of magnetic susceptibility and electrical resistance. This apparent difficulty was turned

to advantage by logging conductivity (the reciprocal of resistivity) simultaneously with susceptibility. The fact that the instrument logs both properties at the same time adds considerably to the value of the instrument.

Another use of magnetic susceptibility is in tracer work. It is possible that iron oxide can be used to mark certain zones, as, for example, the injection point in a water injection well by adding the oxide to the water and allowing it to accumulate on the wall of the hole at the points where the water enters the formation. A susceptibility log should then clearly indicate the point of concentration of the iron oxide. Similar tracer work is being done with radioactive tracer material and the gamma ray log.

The most widely used prospecting method is the seismic survey. As a complementary log an acoustic velocity logging device has been developed by the laboratories of several major oil companies, and concurrent announcements were recently made by Magnolia Petroleum Company[16] and the Humble Oil & Refining Company[17] of their developments in velocity logging. Other companies are also known to have velocity logging instruments under development. The present method of velocity surveying by means of a geophone on a cable is costly and time consuming. Furthermore, the well geophone survey does not give a continuous log since readings are taken at widely spaced intervals, usually on the order of 500 feet. Seismologists are interested in the continuous velocity log as a means of identifying reflection horizons. The characteristic that determines the amount of reflection is known as the specific acoustic impedance and is the product of density and velocity. The velocity log measures directly one of these parameters and is, therefore, a valuable aid in interpreting seismic surveys.

There is good correlation between the velocity log and a resistivity log. This is reasonable because both velocity and resistivity are high in a densely compacted rock and low in porous, fluid-filled rock. The velocity log is not affected by the mud characteristics to any great extent; therefore, it promises to be a good log for correlation puropses.

The graph on pages 56 and 57 shows Magnolia Petroleum Company's velocity logs run in two wells in central Texas. The wells are in the same field and are 3,000 feet apart. The thicknesses of the alternating shale and limestone strata are shown beside them. The velocity log reflects this lithology with lower velocities in the shale and higher velocities in the limestone. The similarity of the logs from the two wells enables the geologist to correlate formations penetrated by one well with those penetrated by the other.

The use of acoustic energy in the borehole is not limited to velocity logging. The transmission or absorption of acoustic energy must depend on specific physical properties, and, therefore, the measurement of transmission or absorption in a borehole may offer a way to gain other useful information about sedimentary rocks.

It is recognized by many that a density log would be very desirable since it would: *first*, enable a geophysicist to know exactly where the main density contrasts exist in the geologic section and permit him to make a better interpretation of his surface gravity data obtained with the gravity meter; and *second*, the density data combined with acoustic velocity data would yield the specific acoustic resistance of the rock strata and permit a better interpretation of seismic reflection phenomena than can be made from velocity or density data alone. At the present time, there is no instrument capable of giving a continuous density log of a borehole. Density data can be obtained by measuring the density of cores taken from a borehole but usually cores are available from only limited sections of the borehole and the cost of continuously coring a well is prohibitive. However, development of a borehole gravity-meter is being seriously considered by some research groups and it is quite probable that such an instrument could be constructed to give a reasonably continuous density log.

An announcement of a dielectric logging device has been made by a German concern[18]. There is a wide difference between the dielectric constants of water and of oil, and a log of dielectric constants should indicate the transition zone from water to oil in a reservoir containing both. It is likely that such a log will be available in the near future.

It would not be proper to leave the impression that progress in well logging is limited to the development of new instruments. In the last few years there has been an ever-increasing demand for the improvement of conventional electric and radioactivity logs. This demand has come from people working on quantitative analysis of the logs. In such work it is necessary to have a reliable calibration of whatever parameter is being measured, and it is highly desirable to know how this parameter is affected by hole diameter, mud condition, invasion of the drilling mud, fluid content of the rock, etc. In addition, theoretical physicists and mathematicians are constantly seeking better explanations or interpretations of the observed phenomena.

The new magnetic and acoustic logs are in only the early stages of commercial application. As these new logs are used on more and more wells, it is quite possible that new and unexpected uses for the logs will be discovered. As is often the case in the progress of technology, the application for which a technique was originally devised may turn out to be less important than other applications which are found later.

In view of the foregoing it must be admitted that the logging picture is becoming more complex at the present time. There is always the possibility, however, that a combination of two or three logs can be found which will virtually eliminate the need for the others. No such combination is offered for consideration at this stage of the development of the logging art. The somewhat embarrassing fact is that, despite the number of logs now available or under development, there is still no direct oil indicating instrument. This is also true of conventional surface prospecting methods. However, in the field of logging where the investigating device comes in close proximity to the oil in the rock, the problem of developing a direct oil finding instrument should be easier than in the field of surface prospecting and it is hoped that the appearance of significantly better logging techniques will not be too far off.

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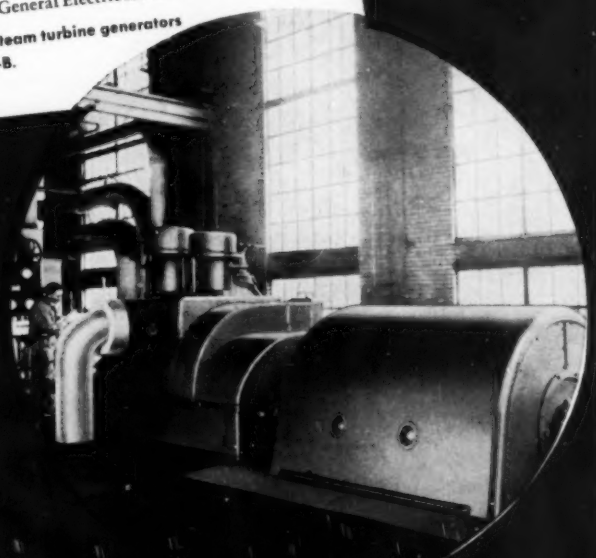

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Staff bungalow at the Seria field, part of a £2 million building program.

British Borneo's Seria Field Expands

By E. Lawson Lomax

THE PRODUCTION of oil in Seria is geographically very important in relation to the other oil producing areas of the world, forming as it does a part of the East Indies, the only producing area in the Far East. The nearest alternative sources of supply are the Middle East and the United States.

With the closing down of the Abadan refinery, there remain in the Middle East only the refineries at Ras Tanura and Bahrein, but the output of this Middle East oil is greatly in demand in Western Europe, while the United States cannot spare the shipments formerly made to the Far East from its own west coast.

Under these circumstances, it is clear that the countries of the Far East, including India, Pakistan, Japan, Australia and the East Indies themselves, must look chiefly to the East Indies for their supply of liquid fuels.

Until the Lutong refinery came into production after rehabilitation in 1946, all crude produced in the field after the war (amounting to about 300,000 tons) was exported for refining.

The daily production in Seria at that time was about 2,000 tons, but has shown a steady increase, rising to 7,000 tons in Dec. 1947, 8,700 tons in Dec. 1948, 10,000 tons in Dec. 1949 and 13,000 tons in Dec. 1950. The present production is 14,000 tons per day, or over 5,000,000 tons per year produced from nearly 200 wells, more than 120 new wells having been drilled since 1945. Miri Oilfield, the only other field in British Borneo, has an annual production of about 50,000 tons.

Further search for oil is continuing in the hope that production will be increased. Intensive geological and geophysical surveys are being carried out over wide areas of Sarawak territory with this end in view.

Already, two wildcat tests are being drilled at Bulak Setap and at Subis, south of Miri, the drilling rigs in use being capable of reaching a depth of 10,000 feet. The Subis test well is accessible to shallow draft craft carrying equipment, stores and personnel up the narrow and tortuous Niah river, the entrance to which, from the China Sea over a shifting sand bar, calls for skilled navigation. Bulak Setap, on the other hand, lacks the advantage of a navigable waterway, and it has been necessary to construct a 30 mile road from Miri at a cost of nearly £200,000.

Apart from the search on land which has continued since the reoccupation, search has been resumed for oil under the bed of the South China Sea, and if successful, it is planned to develop such off-shore reserves. Off-shore wells had been drilled before the war from jetties 800 feet out to sea, and the technique of slanthole or directional drilling was employed to extend the wells several hundred feet further seawards.

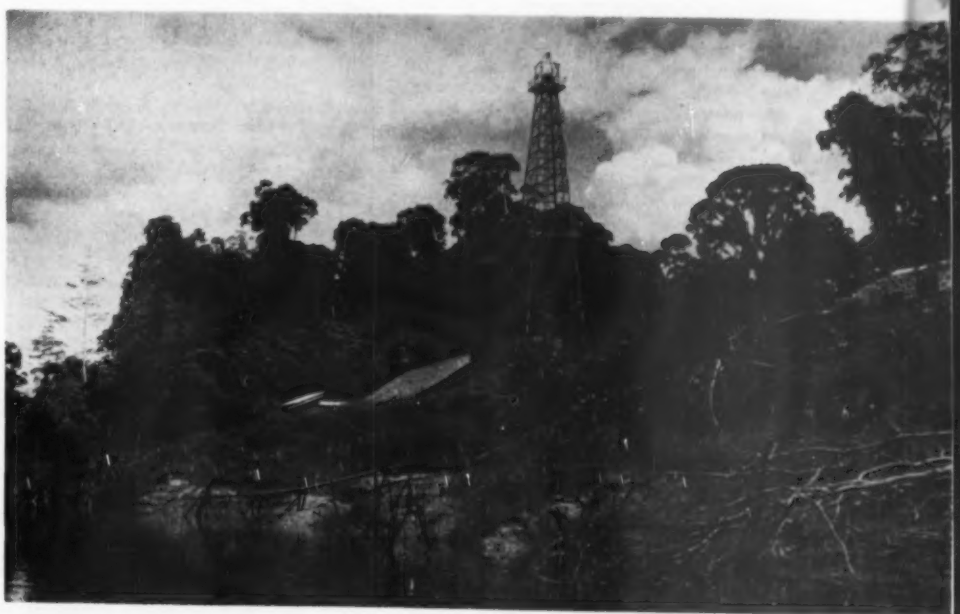
A large amount of the material required for this rehabilitation work has been obtained from sterling sources and has made very little demand on the United Kingdom's limited supply of dollars. British Borneo, therefore, contributes materially to the supply of sterling oil which has to cater for the sterling markets.

When rehabilitation first commenced at Seria, the primary consideration was increased production, and living conditions during this period were necessarily somewhat primitive, although even in those days, the living quarters, of native construction, were supplied with such amenities as electric light, running water, refrigerators and gas cookers.

The present oil company staff is now in the neighborhood of 1,000, being composed of English, Dutch and Australians, together with Malay, Indian and Chinese (many locally born) who are being trained to assume increasing responsibility.

A model township, capable of accommodating over 1,500 families, is being built for Shell by the British firm of civil engineers, Messrs. George Wimpey & Co., Ltd. The permanent houses are being constructed with "Situfoam," a form of cellular concrete particularly suitable for tropical climates.

This township includes such facilities as a hospital, schools, shops, cinemas, and offices. The hospital included in the expansion program is modern and well-equipped, providing 125 beds, with all modern facilities and capable of expansion when required to 175-200 beds, together with general stores, an ice plant and cold storage equipment since most foods, apart from eggs and vegetables, must be imported from the United Kingdom and Australia.



View of well in British Borneo's expanding Seria field.

"AUTOFINING" DESULFURIZATION PROCESS

By E. Lawson Lomax

A NEW catalytic desulfurization process has been developed by the Anglo-Iranian Oil Co. after years of research on the refining of the products from sour crudes. The search for a sulfur removing process was stimulated by the large increase in production of sour crude, particularly in the Middle East and West Texas.

The process has been fully proved over an extended period in a 350-barrel pilot plant, and the first commercial size unit with an input capacity of 3,500 bpsd is now being erected at the Anglo-Iranian Llandarcy refinery in South Wales, to go on stream by the middle of this year.

The basis of the process is the employment of a very stable sulfur resistant catalyst, which has a long life and can be regenerated as required.

The process operates at 50 to 200 lb. gauge and at temperatures of 700° to 800°F, the on-stream period before regeneration of the catalyst varying from 800 to 1,000 hours with the lighter distillates to 200 hours for the heavier and more sulfurous distillates according to boiling range.

Distillates with end points of 662°F. have been successfully desulfurized, but the method is not normally applicable to residual fuels containing asphalt.

The losses are small, varying from 0.5 percent weight on the lighter distillates, to three percent on the heavy SO_2 extracts from kerosine.

The percentage of sulfur removal varies from over 99 percent in the case of the lightest distillates, to 70 percent in the case of virgin gas oils. The sulfur removed is largely converted with hydrogen sulfide, and a small amount of hydrogen, which is re-cycled, is produced. No hydrogen as such is required. In the case of products with an end point of 400°F, the octane number is raised by two to three numbers, and the lead response is considerably improved.

The resulting products are of good color and odor and need no further refining treatment.

Long distillates ranging from 212°-662°F. can be treated as successfully as narrow distillates, which increases its advantage in certain conditions.

The accompanying tables show results obtained in the pilot plant on a variety of distillates. Based on the pilot operations, it is estimated that the cost of a 3,500-barrel commercial plant will be about £250,000 within battery limits. Materials, including common building materials, drafting, engineering, procurement and contractor's overhead and profit will be about £196,000.

Utilities consumption in the 3,500-barrel unit is expected to be 6,600 lb/hr of 150-pound steam, 30,000 Imp. gal/hr of cooling water, 25 million Btu/hr and 10 kw/h electric power.

The process is covered by patents or patent applications in all major countries and is available for licensing by the Anglo-Iranian Oil Co.

TABLE 1

AUTOFINING OF MIDDLE EAST STRAIGHT RUN GASOLINE AND NAPHTHA

	Straight Run Gasoline		Naphtha	
Yield % wt. on feed	99.5		99.7	
Sulfur removal %	99.1		98.4	
Catalyst on-stream period, hrs.	800		400	
	Feed	**Product**	**Feed**	**Product**
Spec. Gravity 60°F.	0.6957	0.6995	0.7800	0.7788
Gravity ° API.	71.9	70.8	49.9	50.2
Distillation				
I.B.P. °F.	81	78	298	284
5% vol. at °F.	104	102	308	303
10% " " "	116	112	312	307
50% " " "	200	200	332	329
90% " " "	269	270	369	369
End Point °F.	299	300	403	408
Sulfur %	0.081	0.0007	0.116	0.0019
Octane No. (Motor)	60.0	62.3	—	—
" " + 1.5 ml TEL/IG.	69.0	75.0	—	—
" " + 3.5 ml TEL/IG.	75.0	81.0	—	—
Color, Saybolt	ca. 20	+30	ca. 20	+26
Doctor Test	Pos.	Neg.	Pos.	Neg.
Corrosion Test	Pos.	Neg.	Pos.	Neg.

TABLE 2

AUTOFINING OF LONG DISTILLATES FROM MIDDLE EAST AND SLAUGHTER (WEST TEXAS) CRUDE OILS

Distillate from	Middle East Crude		Slaughter Crude	
Cut on Crude T.B.P., °F.	212-662°		203-662°	
Yield of Product % wt. on Feed	99+		99+	
Sulfur Removal, %	84.5		84.9	
	Feed	**Product**	**Feed**	**Product**
Spec. Gravity, 60°F.	0.8005	0.7975	0.8285	0.8220
Gravity, °A.P.I.	45.3	45.9	39.3	40.6
Distillation				
I.B.P., °F.	193	—	255	243
10% vol. at °F.	249	—	302	291
50% " " "	407	—	448	437
90% " " "	594	—	604	590
End Point, °F.	653	—	639	626
Sulfur, %	0.387	0.06	1.15	0.174
Naphtha Fraction				
T.B.P., °F.	I.B.P.-356°	I.B.P.-356°	I.B.P.-356°	I.B.P.-356°
Yield, % wt.	34.8	37.9	30.1	31.6
Spec. Gravity, 60°F.	0.7585	0.7600	0.7805	0.7785
Gravity, °A.P.I.	52.6	54.7	49.8	50.3
Distillation				
I.B.P., °F.	207	199	232	239
50% vol. at °F.	279	276	289	289
End Point, °F.	367	361	369	363
Sulfur, %	0.081	0.002	0.302	0.0025
Sulfur Removal, %	—	97.5	—	99.2
Octane No. (Motor)	—	45.0	47.6	52.0
Kerosine Fraction				
T.B.P., °F.	356-482°	356-482°	356-482°	356-482°
Yield, % wt.	35.7	34.3	25.3	28.4
Spec. Gravity, 60°F.	0.8085	0.8075	0.8180	0.8170
Gravity, °A.P.I.	43.5	43.7	41.5	41.7
Distillation				
I.B.P., °F.	372	376	388	379
50% vol. at °F.	418	417	415	412
End Point, °F.	480	475	484	459
Sulfur, %	0.243	0.015	0.694	0.057
Sulfur Removal, %	—	93.8	—	91.8
Gas Oil Fraction				
T.B.P., °F.	482°+	482°+	482°+	482°+
Yield, % wt.	29.5	27.8	44.6	40.0
Spec. Gravity, 60°F.	0.8410	0.8440	0.8720	0.8635
Gravity, °A.P.I.	36.8	36.1	30.8	32.4
Distillation				
I.B.P., °F.	509	507	520	514
50% vol. at °F.	549	541	568	560
End Point, °F.	655	639	664	658
Sulfur, %	0.89	0.23	1.79	0.384
Sulfur Removal, %	—	74.2	—	78.5
Diesel Index	—	59	46	48

TABLE 3

AUTOFINING OF MIDDLE EAST KEROSINE

Yield of product % wt.	99.5
Sulfur removal %	98.0
Catalyst on-stream period, hrs.	400

	Feed	Product
Spec. Gravity 60°F	0.7985	0.7981
Gravity ° API.	45.7	45.8
Distillation		
I.B.P. °F.	336	329
2% vol. at °F.	352	345
10% " " "	365	363
50% " " "	404	404
90% " " "	446	448
End Point °F.	471	476
Sulfur %	0.180	0.004
Mercaptan Sulfur %	0.016	<0.001
Color, Saybolt	+15	+17
Flash Point °F.	126	106
Odor	Poor	Good
Doctor Test	Positive	Negative
Smoke Point mm.	25	25
Burning Test (Institute of Petroleum)		
Consumption g/hour.	20.6	20.1
Char Value mg/Kg.	28	14
Appearance of Glass.	Grey-brown film.	Very faint grey film.

TABLE 4

AUTOFINING OF MIDDLE EAST VIRGIN GAS OILS

Yield of product % wt.	99.1
Sulfur removal %	70.0
Catalyst on-stream period, hrs.	210

	Feed	Product
Spec. Gravity 60°F.	0.854	0.849
Gravity ° API.	34.2	35.2
Distillation		
I.B.P. °F.	459	248
10% vol. at °F.	520	505
50% " " "	561	556
90% " " "	619	612
End Point °F.	662	662
Sulfur %	1.00	0.30
Diesel Index	55	55
Aniline Point °F.	160	160
Carbon Residue (10% bottoms) %	0.11	0.11

The above inspection data refer to the total liquid product which contains a very small quantity of light ends. Removal of these light ends is easily accomplished in a simple flashing operation to give a product meeting specification flash point requirements.

TABLE 5

AUTOFINING OF AROMATIC SO_2 EXTRACTS

	Extract from Middle East Naphtha		Extract from Middle East Kerosine	
Yield of Product % wt.	97.5		97.0	
Sulfur Removal, %	98.6		92.5	
Catalyst on-stream period, hrs.	200		200	
	Feed	**Product**	**Feed**	**Product**
Spec. Gravity, 60°F.	0.836	0.835	0.869	0.864
Gravity, ° API	37.8	38.0	31.3	32.3
Distillation				
I.B.P. °F.	239	230	311	286
5% at °F.	246	243	329	318
10% " "	248	246	338	327
50% " "	264	261	372	369
90% " "	293	291	451	451
End Point, °F.	325	327	489	496
Octane No. (Motor)	85.3	87.2	—	—
Aromatics, % wt.	78.1	76.2	75.5	73.8
Color—Saybolt	+15	+27	0	+22
Sulfur, %	0.295	0.004	0.692	0.052

WASHINGTON DATELINE

DECONTROL GAINS MOMENTUM

By Joseph Huttlinger

A PATTERN of government decontrol over prices, wages and materials allocations is being rapidly established. The Office of Price Stabilization has suspended price controls over 16 items, and plans to add more to the list. Allocations over materials are being ended almost daily. Many allocation programs that continue mean less day by day as it becomes clear that supply is equal to meeting all demands.

The government's list of basic commodities in short supply becomes briefer with each publication. Down payment controls for consumer items, including automobiles, one of the first controls put into effect, have been ended. Down payment rules for new homes may go soon. A steel industry task force has again called for the end of steel allocations, or rationing, except for steel for atomic energy and direct defense needs.

New plant capacity is coming in, said the Federal Reserve Board in ending the credit controls. Thus, chemicals and machinery plant capacity doubled in the past two years; petroleum is up 50 percent; electric power 75 percent; and steel ingot capacity 30 percent.

In the field of petroleum, tetraethyl lead is again free of government allocations, after a year of control by the Petroleum Administration for Defense. Quebracho, used in preparing drilling muds, is again free of controls after a year. The PAD's ban on taking on new natural gas customers is being eased company by company, area by area. The supply of steel and other materials for petroleum is improving. John E. Boice of PAD's supply and transportation division sees more line pipe ahead; Robert L. Foree, head of PAD's production division, foresees a betterment in oil country tubular goods.

A total of 10 large crude oil pipe lines and eight new products lines received a go-ahead from the PAD for the third quarter of this year. Natural gas lines also were on the list.

PAD has flashed the green light for two of the largest oil pipe lines in many years. One is a proposed 1,100-mile West Texas to Los Angeles line to carry crude. The company is the West Coast Pipe Line Co., of which Burt Hull, builder of the famed Trans-Arabian pipe line, and L. M. Glasco, Dallas, Texas, are officers.

The other line would run from Beaumont, Texas to Cincinnati, Ohio and on to Newark, N. J., a total of 1,600 miles, and would be the longest oil pipe line in America. The cost would be $69 million for the 14 to 16-inch line. U. S. Pipe Line Co., New York, is back of the line. PAD approval is subject to further engineering, financing and crude supply information.

A tipoff to the government's optimism on steel for petroleum lies in the approval of PAD's 18-month, $10.5 billion oil industry expansion. The approval was something of a surprise, as the Defense Production Administration had been expected to shave down the plan. Instead, it raised it at one point, proposing 500,000 barrels daily a year of new refining capacity in America, against PAD's proposal of 475,000.

The international oil program, as now endorsed, proposes the drilling of 90,128 new oil wells at home and abroad in the 18 months starting next July 1; addition of refining capacity at home and abroad of 884,000 barrels daily; laying of 23,500 miles of new crude oil and products pipe lines; and adding storage capacity totaling 188 million barrels.

All these factors add up to an easing of materials controls now or soon. The general feeling is that we are over the hump in defense buildup.

In government, however, warnings of shortages and inflation are still heard, if feebly. Bruce K. Brown, deputy head of PAD, who retired June 1, warns of tight steel supply ahead.

As for price controls over crude oil and products, the point has now arrived where even some in the OPS say the controls can be removed, but Price Director Ellis G. Arnall and his chief deputy, Edward F. Phelps, Jr., have refused to budge.

The petroleum industry has asked both OPS and the Congress to remove price controls. The Independent Petroleum Association of America, leading the fight, contends on the one hand that the supply is such that no inflationary price rise would follow, and on the other hand that the defense needs for more petroleum justifies somewhat higher crude oil prices. While the OPS has flatly refused, the Congress might take some action.

The price-wage-allocation controls bill, the Defense Production Act, is up for extension beyond its June 30, 1952 expiration date. The Truman administra-

(Please turn to page 64)

OIL SPURS ACTIVITY ON CANADA'S WEST COAST

BY DON TYRELL

VANCOUVER, B. C.

ALTHOUGH Canadian oil and gas have yet to reach this Pacific port, the knowledge that both are coming, plus the encouraging results from efforts to develop production within the Province itself have stimulated intense interest and led to active preparations to deal with the vast developments involved.

Contract for the construction of part of Imperial Oil's new $13,500,000 refinery at Ioco has been let to Canadian Bechtel and preliminary work has been started. Employing up to 650 men, the expansion program will raise Ioco's capacity from 12,000 to 22,500 barrels daily, using Alberta oil delivered via the Trans Mountain oil pipe line now under construction from Edmonton.

New equipment includes a fluid catalytic cracking unit of 7,600 barrel capacity. Work is expected to be completed in the Fall of 1953.

Vancouver shipping interests in the meantime are pressing the Canadian government to deepen and widen the harbor channel to accommodate the large tankers expected when the oil line terminus on Burrard Inlet is ready to export oil. A depth of 40 feet for the harbor entrance is asked.

Fort St. John No. 7, a Pacific Petroleum well in British Columbia's Peace River field, came in with a large blow April 24. Officials report that two drill stem tests in the top of the upper levels of the Triassic sands gave a flow of 1,394,000 cubic feet of natural gas per day.

This well is located between the No. 1 discovery well and No. 4 which has proved to be a large gasser. From a depth of 3,687 to 3,709 feet with the valve open 115 minutes, gas came to surface in seven minutes at the rate of 537,000 feet. From 3,707 to 3,720 feet with the valve open 110 minutes, gas came to the surface in four minutes at the rate of 857,000 feet.

Number 7 is the second Pacific Petroleum well to encounter oil. On April 14 a drill stem test between 3,109 and 3,114 feet recovered 150 feet of light green oil. Although tests are not yet complete, the oil is reported to have a gravity of 40 degrees API.

Further tests made April 28 showed 3,440,000 cubic feet of gas plus some oil. A gas-filled water-free zone of 76 feet was found in the upper portion of the Triassic formation. Pacific plans another well, Fort St. John No. 8, in the same area in Lsd 13, section 34, township 83, range 19, west of the 6th.

Fort St. John oil and gas discoveries are in the vicinity of Westcoast Transmission's proposed gas export pipe line route from Alberta to the British Columbia coast. The British Columbia discoveries together with recent finds on the Alberta side add to the growing gas reserves of this northern section.

Texaco Oil and Pacific Petroleums share in a gas discovery made on the Alberta side near the pipe line route. The well, Texaco Pacific Dixonville No. 1, showed 5,850,000 feet per day on drill stem tests in the Gething sands.

Bechtel Corp., builders of the Trans Mountain oil pipe line, have been assessed an additional $33,000 by the municipality of Burnaby in which the pipe line terminus will be located. The additional charge is to provide roads, pumps and a water tank to service the property it wishes to purchase. The property is 80 acres of municipal land and the company is negotiating for the purchase of an adjoining 150 acres from the provincial government. There are several hundred acres left in the same area that could be used for the pipe line terminus.

Bechtel has ordered concrete anchors for pipe laid across the rivers on the pipe line route from Vancouver and Calgary firms. For sixty river crossings between Edmonton and Vancouver, anchors weighing about 5,200 pounds a set will be built of concrete reinforced with steel bars. Aerocrete Construction (B.C.) Ltd., Vancouver, will supply 360 sets, while F. T. Edwards of Calgary will supply 760 sets.

Four plywood and aluminum trailers for offices will be built by United Trailer Co. of Edmonton. These mobile field headquarters for Bechtel's inspectors will be nine by 30 feet and will cost $3,000 each.

Of interest to consumers has been a reduction in gasoline and fuel oil prices through action of Imperial Oil Ltd. Gasoline prices dropped three-tenths of a cent per gallon while light fuel oils dropped one-tenth. Imperial's reduction was made because of improvement in the Canadian dollar position which made purchases of American oil cheaper in Canada despite an increase in freight charges.

Washington Dateline

(Continued from page 63)

tion has asked a two-year extension, and that the act be strengthened. Present indications are that Congress may extend it for no more than six months, if at all, and modify it somewhat.

One "weakening" amendment, which appears to have substantial support, would remove price controls over essential commodities which are in adequate supply. The definition of adequate is that the commodity is not being allocated by government to users.

The petroleum industry strike, if prolonged, could change this outlook. It already has brought restrictions on the use of aviation fuel and other products. It could bring shortages that might provide an argument for continuing price ceilings. If the strike is a brief one, a more general reaction might be disgust with the mismanagement of the Wage Stabilization Board, and of the whole controls program. At this writing the feeling here is that the strike may end before these lines appear in print.

The same thing, in general, goes for steel. The steel strike, which went on nearly a week, cost the nation 300,000 tons of steel daily. Of this, about 30,000 tons was for the petroleum industry at home and abroad. And of this, about 6,000 tons was for oil country tubular goods for drilling new wells. This means steel for 150 new wells daily was lost in the strike.

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TTC Refining

In 1943 the first commercial Thermofor Catalytic Cracking unit — using a *continuous* catalytic process — went into production. Created by Flying Red Horse research, this TCC process made possible greater quantities of high octane stocks and even better gasolines!

Mobilgas

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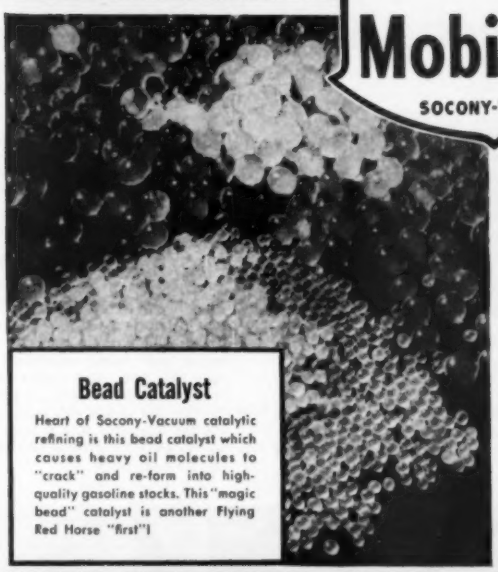

Bead Catalyst

Heart of Socony-Vacuum catalytic refining is this bead catalyst which causes heavy oil molecules to "crack" and re-form into high-quality gasoline stocks. This "magic bead" catalyst is another Flying Red Horse "first"!

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TCR — Thermal Catalytic Reforming Process — latest in catalytic processing — produces highest-quality blending stocks from low-quality material . . . assuring continued Flying Red Horse leadership!

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BRITISH OIL NEWS

By E. Lawson Lomax

The Hague to Hear Anglo-Iranian Dispute

The hearing of the case of the Anglo-Iranian Oil Co. vs. the Persian Government before The Hague International Court is scheduled for early June, reviving interest in a topic which has had little recent discussion.

Britain is asking the International Court to declare that Persia's unilateral annulment of the 1933 Concession is an illegal act for which Persia is responsible under international law; to restore the oil company's rights in Persia; and to award compensation for loss or damage resulting from the Persian Government's action.

Alternatively, Britain asks the Court to rule that Persia should compensate the British Government, on behalf of the oil company, to the full value of the oil industry for loss of future profits and for losses already sustained, the court to determine the method by which compensation is assessed.

The Persian counter-memorial submits that the International Court is not competent to adjudicate on the dispute as the issue is one exclusively within Persia's domestic jurisdiction. It claims that Article 2 (paragraph 7) of the United Nations Charter prohibits United Nations intervention in the internal affairs of a member state.

The British reply to this maintains that the Court has jurisdiction under Article 36 of its statute, which says that all parties of the statute recognize the jurisdiction of the Court in disputes about the interpretation of a treaty, any question of international law, and breaches of international obligations.

Tanker Chartering Decreases

During the past month the demand for tonnage in the sterling area has decreased considerably, with the result that there has been little chartering activity so far as London is concerned, and rates are declining.

It is apparent that while the number of carriers available at present is not excessive, they are more than sufficient to meet the needs of charterers, and it is anticipated that owners will have to shade their figures before rates level out for the summer season.

Institute of Petroleum Elects New President

H. S. Gibson, managing director of Iraq Petroleum and associated companies, was elected president of the Institute of Petroleum for the session 1952/53 on April 24, succeeding C. A. P. Southwell of the Kuwait Oil Co. in this office.

Before becoming managing director of the Iraq group on January 1, 1950, Mr. Gibson had been general fields manager of the Anglo-Iranian Oil Co. in Persia, and was awarded the Redwood Medal of the Institute of Petroleum in 1947 in recognition of his pioneer work on the control of limestone reservoirs and the multistage stabilization of crude oil. In the same year he became a Commander of the Order of the British Empire.

H. S. Gibson

Anglo-Iranian Reorganizes Refineries Department

The rapid growth of Anglo-Iranian's refinery interests outside Persia, which embrace a dozen plants in Europe, Asia and Australia, has necessitated a reorganization of the company's refineries department.

The new arrangement splits the department into six divisions under C. E. Spearing, general manager, with M. A. L. Banks as his deputy.

The divisions and managers are as follows: Research and Development, D. G. Smith; Engineering (execution of projects and providing regional divisions with engineering services), R. C. Thomson; United Kingdom Division, H. W. Rigden; Continental Division, manager not yet appointed; Middle East Division, S. W. Adey; and Australian Division, covering new refinery, D. W. K. Barker.

World's Largest Tanker Goes Into Service

The tanker S. S. "World Unity," of 31,745 deadweight tons, the largest yet to join the world's oil carrying fleets, was handed over to her owners, World Tanker Corporation of Liberia, by the builders Vickers-Armstrong, Ltd. on satisfactory completion of her trials. The North American Shipping and Trading Co. (London) acts as agent in the United Kingdom for World Tanker Corp. vessels.

Messrs. Harland & Wolff, Govan, announce that the M. V. "Iliade," a single-screw motor driven oil tanker of approximately 19,000 deadweight tons, has successfully completed her trials and has been handed over to her owners, Societe Naval Delmas-Vuljuix and Societe Anonyme Courtage et Transports, Paris.

The propelling machinery consists of one single-acting Harland-B & W six cylinder two-cycle engine of the builders' latest opposed piston design, with exhaust pistons controlled by eccentrics on the crank shaft.

Trans-Desert Pipe Line Completed

Pipe laying has now been completed on the Iraq Petroleum Co.'s 556-mile long trans-desert line from Kirkuk, North Iraq, to Banias, the Mediterranean terminal. This completion is six months ahead of schedule.

First shipments from Banias of oil pumped through this line began April 11, and in ten days 63,000 tons had been loaded and dispatched, the first consignment of 15,000 tons for the United Kingdom on the tanker "Barren Hill" being destined for the Fawley refinery.

New, powerful pumping installations now under construction along the line will, when completed later in the year, enable this new 30 inch line to convey 14 million tons of crude per year to the Mediterranean seaboard.

National Benzole Appointment

National Benzole Co., Ltd., announces that C. G. Brook has been appointed general manager of the company as from April 1, 1952.

He joined the company on May 1, 1920, and became manager of the London division in 1921. In 1926, he went to Manchester as manager of the Lancashire division, returned to London in 1928 as group sales manager at the head office, was promoted to sales manager in 1937, and became assistant general manager May 1, 1949.

During the war years he was deputy general sales manager of the Petroleum Board. In 1949 he was appointed a member of the London Electricity Consultative Council.

Kent Refinery

Construction work on the first part of the new four million tons per year Kent refinery of the Anglo-Iranian Oil Co. is in an advanced stage, the 80,000 barrels per day Badger crude distillation unit being scheduled to go on stream in July this year, less than two years after the first operations at the site commenced. This will be the largest single crude oil distillation unit in the United Kingdom and when in operation will make the A.I.O.C. the largest refiners of crude oil in the British Isles.

C. E. Spearing *M. A. L. Banks* *D. G. Smith* *R. C. Thomson* *H. W. Rigden* *S. W. Adey* *D. W. K. Barker*

THE MAN IN THE IRON MASK

THIS man is a welder working on a new pipeline at one of Anglo-Iranian's three oil refineries in the United Kingdom. Anglo-Iranian's refinery expansion continues on a world-wide scale. In addition to the nine refineries in Europe and Australia already operated by Anglo-Iranian and its associated companies, a new refinery in Belgium recently went on stream and another new refinery is under construction in the United Kingdom.

THE BP SHIELD IS THE SYMBOL OF BP THE WORLD-WIDE ORGANISATION OF

Anglo-Iranian Oil Company

LIMITED

REPRESENTATIVE IN U.S.A.: W. D. HEATH EVES, 610 FIFTH AVENUE, NEW YORK 20, N.Y.

British Catalyst Plant In Production

Full scale production of petroleum cracking catalysts has been reached in the plant built by Joseph Crossfield & Sons, Ltd., an affiliate of Lever Brothers & Unilever Ltd., at Warrington, England, according to advices received by R. L. Hockley, executive vice-president of The Davison Chemical Corp. of Baltimore, whose processes are being used in the plant.

The plant is designed to produce at the rate of more than 10,000 short tons of catalyst a year, sufficient to process about 90,000,000 barrels of petroleum, based on average refinery use of cracking catalyst.

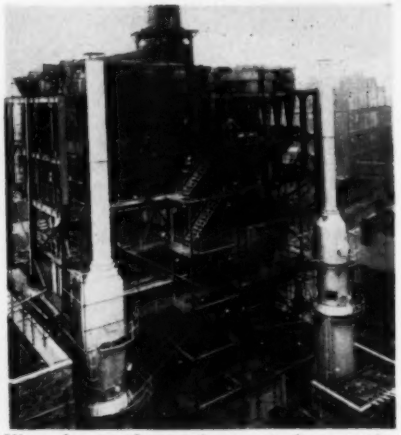
The development was brought about through agreements by Davison with five important oil companies which will use the catalysts in their refinery operations: Esso Petroleum Co. Ltd., Anglo-Iranian Oil Co., Ltd., Shell Refining & Marketing Co., Ltd., Trinidad Leaseholds Ltd., and Bahrein Petroleum Co., Ltd.

Approximately one million pounds sterling has been invested by the British interests in the operation, which will save the United Kingdom several millions of dollars annually in exchange. Davison, however, will be compensated in dollars for providing technical advice and guidance both in the building of the plant and its continuous operation.

The Davison process for producing the microspheroidal type of synthetic fluid silica-alumina petroleum cracking catalyst is employed at the plant. Among the equipment used are two Swenson Evaporator Co. stainless steel dryers, fabricated under license in Great Britain.

Errata

In an article relating to the new Iraq pipe line it was erroneously stated that total production from Kirkuk in 1952 was estimated at more than 980 million barrels. The figure should have been 98 million. Just a cipher added, but a substantial difference.



View of spray dryers of new petroleum catalyst plant constructed at Warrington, England, by Joseph Crossfield & Sons, Ltd., an affiliate of Lever Brothers & Unilever Ltd., under the technical direction of the Davison Chemical Corporation, Baltimore.

Esso Awards Service Button

At a meeting of the directors of the Esso Petroleum Co. on April 17, T. A. Lumsden, secretary of the company since 1945, was presented with his 30 years' service button by L. Sinclair, chairman and managing director.

Mr. Lumsden graduated in mercantile law with honors at Edinburgh University and then qualified as chartered accountant. He joined the company in 1922 and in 1931 was appointed chief accountant. He is also secretary of the British Mexican Petroleum Co., Redline-Glico and Esso Pension Trust, Ltd.

Kuwait Tankers Join U.K. Coastal Fleet

Three 850-ton tankers, the Adib, Amin, and Amir, formerly used to carry fresh water from the Shatt-al-Arab river to Kuwait, have arrived in England to join the Shell-Mex and B. P. coastal fleet. Water condensing plant now in operation in Kuwait has reduced the need for transporting fresh water, and the vessels were no longer required there.

British officers, sent by air to Kuwait, and Indian crews from Bombay brought the vessels to England where they have been overhauled and refitted to suit them for their new occupation. Owing to heavy weather, the vessels, each carrying a cargo of premier-grade kerosine from Bahrein, took about 60 days for the 6,200-mile voyage from the Persian Gulf, and on occasions were forced to take shelter.

The vessels are some of those built during the last war to the order of the Ministry of War Transport, six others of which were previously acquired by Shell-Mex and B.P. and are already giving good service in delivering petroleum products to the company's coastal storage installations.

Fifth Caltex U.K. Tanker Launched

Announcement was made from London on May 22 of the successful launching of the S.S. "Caltex Liverpool," fifth ship to be built for Overseas Tankship (U.K.), Caltex affiliate, under the program for construction in the United Kingdom of eleven tankers.

Sponsor of the new tanker was Mrs. Howard M. Herron, wife of the chairman of the executive committee and director of the Caltex group of companies. The vessel, built by R. & W. Hawthorn, Leslie and Co., Ltd. of Hebburn-on-Tyne, England, is 543 feet in length, 70 foot beam and has a deadweight tonnage of approximately 17,000. The vessel is powered by a 7,300 Shp steam turbine and will have a trial speed of 15.5 knots.

MILLENNIUM-KEY

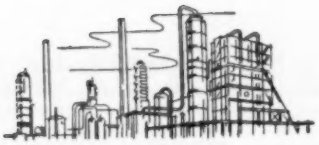
PETROLEUM FITTINGS

MILLENNIUM KEY

Cast Steel Fittings for oil refinery and chemical plants are manufactured throughout at Braintree by Lake & Elliot Ltd. Close metallurgical control is maintained by competent chemists working with modern apparatus. The independent inspection department can carry out inspection, or work in conjunction with customers own inspectors.

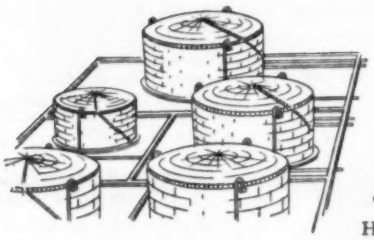
Lake & Elliot Ltd.

BRAINTREE ENGLAND



FIGHTING OIL FIRES

-the NEW way!



The Mechanical Foam Tender is today's answer to major fire dangers wherever oils and spirits are stored or processed in bulk. That illustrated above is a "PYRENE" Foam Tender built on a Dennis F 2 chassis with Rolls Royce B.80 160 b.h.p. engine. Having a foam compound tank capacity of 600 imperial gallons, it is capable of delivering a maximum of 4,500 imperial gallons of Mechanical Foam per minute, producing a total output of 120,000 imperial gallons of foam without replenishment of Foam Compound. It carries two No. 20 and one No. 10 "PYRENE" Mechanical Foam Generators and four No. 10 "PYRENE" Foam-making Branchpipes. Foam Compound is automatically induced into the water heads of this foam generating equipment. Full details of this and other Tenders supplied for refinery fire protection will be sent, without obligation, if you will kindly write to Dept. W.P.6.

Pyrene TRADE MARK FIRE APPLIANCES

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Pyrene Manufacturing Company, Newark, N. J., U. S. A. and Pyrene Manufacturing Company of Canada, Limited, Toronto, Ontario, Canada.

INTERNATIONAL NEWS AND NOTES

Planning Pakistan Refinery

A three-man mission of refinery and marine experts arrived in Karachi at the beginning of May to examine and report on the technical aspects of the proposed installation of an oil refinery there with special reference to selection of a suitable site.

The experts are Capt. S. C. C. Thomson, J. Handerson, and R. Cook. Government officials to be associated with these representatives of the Burmah Oil Co. are Z. H. Kahn, chairman, Karachi Port Trust; Hadi Hasan, joint secretary; and M. Siddiqui, deputy secretary of the Ministry of Industries.

Burmah Oil Co. in March of this year offered to erect a refinery at Karachi as a result of talks between the government of Pakistan and W. E. V. Abraham, managing director of the company.

Results of State Plan for 1951

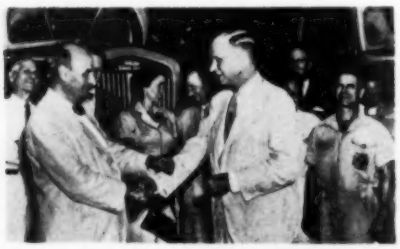
The Central Statistics Directorate of the Romanian Cabinet has issued a communique stating that the annual plan of industrial production for 1951 was completed 104.5 percent. Among the 45 items on which output for 1951 was higher than in 1950, are: crude oil, 123.1 percent; methane gas, 131.2 percent; drilling trolleys, 153.1 percent; rotary tables, 112.9 percent; mud pumps, 130.9 percent; and electric motors, 218.7 percent.

White Honors Veteran Employees

Forty members of the distributing organization of White Motor Co. in South America have received service pins for long employment records by Robert F. Black, president of the company.

Mr. Black recently toured South America and included on his trip visits to Cia. Expresso Federal distributorships in Sao Paulo and Rio de Janerio. He made awards for service records ranging from ten to 30 years, including a 30-year pin awarded to Harry Covington, managing director of Cia. Expresso Federal.

The "pin award" luncheon, held 5,500 miles from the Cleveland factory was the first ever held overseas by White and was conducted in two languages, English and Portugese.



Robert F. Black, left, president of White Motor Co., congratulates Harry Covington, recipient of 30-year service award, as other award winners look on.

Shipments Begin From Minas Field

First shipments of crude oil from the Minas field in central Sumatra were begun by Caltex Pacific Petroleum, Mij. in mid May. The company now has 33 wells in production in this field. Transportation facilities recently completed permit the regular dispatch of cargoes from the terminal at Sungai Pakning and provide additional supplies for Pacific marketing areas.

Soviet Production

Radio Moscow, in stressing the rapid development of the oil industry, claims that the average annual increase in Soviet petroleum production has been 4,500,000 tons. In 1951, oil refinery capacity increased by 120,000 b/d. Total 1951 production is estimated at 900,000 b/d, with the eastern oil fields producing over half that amount. An output of 1,040,000 b/d is planned for 1952.

Minister of the Crude Oil Industry N. Baibakow reported to Premier Stalin that the Soviet oil industry had fulfilled its plan three days before the date set for 1951.

Soviet reports are never very specific, as witness this speech by L. P. Beria on November 6, 1951: "In the past years we have had an annual increase in crude oil production of 4.5 million tons. In the coming year we are sure to surpass all expectations of the plan. Due to a great program of test-borings, a large number of new oil deposits have been found, and the number of productive wells has been greatly increased. The new works alone, which are furnished with the most modern, up-to-date machinery and equipment of domestic manufacture, and which are in the process of being opened now (1951), can produce six million tons of petroleum. It is certain that the task set by Comrade Stalin for the year 1960 will be fulfilled long before this date."

From previous production records, certain general figures can be deduced, and oil men believe the following are fairly reliable:

CRUDE OIL
(in millions of metric tons)

1940	1950	1951	1960
31	37.6	42.1 (Based on Beria's speech)	60 (Goal Set by Stalin)

Austrian Oil Supplies Higher

The crude oil supply in Austria in 1951 improved greatly in comparison with 1950. A total of 183,366 tons of gasoline was available, representing an increase of 51.4 percent over 1950 figures. Domestic output was raised from 81,250 tons to 155,500 tons, while imports dropped from 39,897 tons to 27,866 tons.

Domestic production of kerosine was raised to 39,500 tons, 46.3 percent above the 1950 figures. The quantity of gas oil available was 186,700 tons, an increase (entirely from domestic production) of 19.2 percent. In 1950, 16,750 tons were imported. Fuel oil was available in the amount of 318,500 tons.

Consumption of lubricants in 1951 was 54,020 tons, 35.1 percent above 1950. Domestic output also increased during the last two years and rose from 37,300 tons to 42,800 tons. Bitumen availability was 33,979 tons, 77.4 percent above 1950 (21,500 tons).

Platforming Unit for CEPSA

Work will begin shortly on the installation of a 5,000 barrel-per-day UOP Platforming unit for Compania Espanola de Petroleos, S.A. The unit will be constructed at the company's refinery located at Santa Cruz, Tenerife, in the Canary Islands. This is the thirtieth Platforming unit to go into design and brings total design capacity of units in operation, or under construction, to approximately 115,000 barrels daily. The unit is scheduled for completion in late 1953 or early 1954, being built primarily for motor fuel production. Design will be by Universal Oil Products Co. and construction will be handled by Procon, Inc.

Saudi Arabian Production

Crude oil production in Saudi Arabia during April amounted to 26,362,689 barrels, or an average of 878,756 barrels per calendar day, it is announced by the Arabian American Oil Co.

Crude processed at the company's refinery at Ras Tanura amounted to 4,484,645 barrels, or an average of 149,488 barrels per calendar day.

Crude oil production for the first four months of 1952 amounted to 103,371,505 barrels, an average of 854,309 barrels per calendar day. Crude runs in the refinery for the same period were 30,573,083 barrels, an average of 170,025 barrels per calendar day.

Ship Refinery to Russia

According to Radio Zagreb, the Soviet Government has asked for the transfer of the Ploesti refinery to Soviet territory. The Romanian Government has agreed to this order of transfer, and work on the removal of the refinery installations in Ploesti was announced last fall to be close at hand. Disassembling of the plant has begun, and shipment is to occur during the coming months.

Sinclair to Explore in Somaliland

A report from Rome states that the Italian Trusteeship Administrator for Somali has signed an agreement with the Sinclair Somal Corp. authorizing the company to explore for oil in former Italian Somaliland. The area involved is on the opposite side of the Ogaden desert from the district in which Sinclair is engaged in prospecting in Ethiopia.

Houston Nomads Entertain

At their April meeting Houston Nomads were entertained by films shown by Jack Kinley of the oil well fire fighting firm of M. M. Kinley Co. Mr. Kinley's pictures showed the extinguishment of a 1951 oil well fire in Iran as well as of past fires in the United States and Romania. Five oil men from abroad were visitors at the meeting.

Foreign visitors at the April meeting of the Houston Nomads were, left to right, C. L. Smith, PETCO, Maracaibo, Venezuela; Jean P. Rochet, SEREPT, Tunis; George Cormack, Shell Oil Co., Calgary; A. J. Dodini, Bahrein Petroleum Co. Ltd., Bahrein Islands; and C. F. Watts, Shell Oil Co., Calgary.

Albanian Crude Oil Production

Latest reports give Albanian crude oil production at more than 350,000 tons annually. The new refinery at Tscherzik will process all types of oil products.

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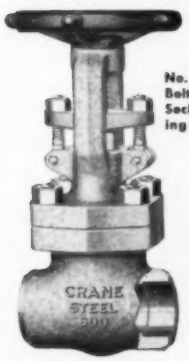
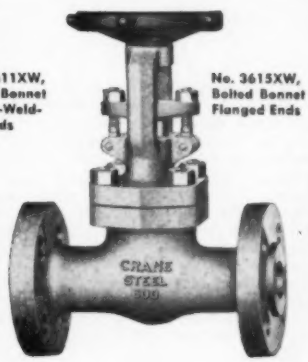
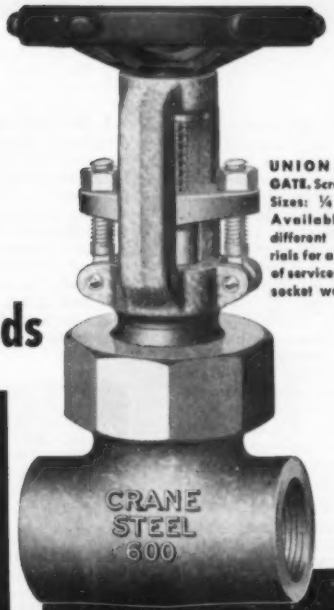


No. 3611XW, Bolted Bonnet Socket-Welding Ends



No. 3615XW, Bolted Bonnet Flanged Ends



UNION BONNET GATE. Screwed ends. Sizes: ¼ to 2-inch. Available in three different trim materials for a wide range of services. Also with socket welding ends

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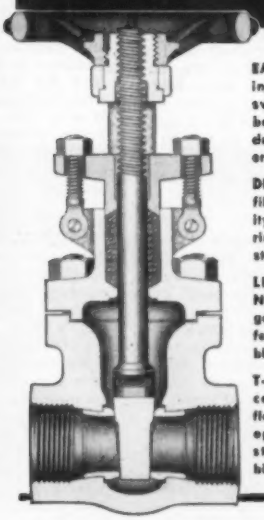

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OIL COMPANY STAFF CHANGES

T. A. VAN GRIETHUYSEN, manager of Continental Oil Company's crude oil trading department since 1948, has been promoted to the newly created position of coordinator of transportation and supplies. Mr. van Griethuysen will make his headquarters in Houston, and will be in charge of the company's motor transportation, traffic and crude oil trading activities. An employee of Continental since 1929, he has been associated with the company's production and crude oil trading departments for the past 17 years.

F. E. Butterfield, assistant manager of the crude oil trading department since 1950, has been promoted to manager. Mr. Butterfield, whose headquarters will remain in Ponca City, Okla., has held a succession of positions with Continental in Texas and Oklahoma over the past 22 years.

D. W. Sims and P. H. Kuhns will continue to manage Conoco's motor transportation and traffic departments, respectively, it was announced. Both have headquarters in Ponca City.

WARRACK WALLACE has been appointed general counsel of Standard-Vacuum Oil Co., filling the post vacated by L. V. Collings, chairman of the company board of directors.

Mr. Wallace's first association with the oil industry was in 1914 on completion of his civil engineering studies at Purdue University. He went to China the following year on a petroleum marketing assignment, and, with the exception of a year's military service in World War I, remained in the Orient until 1921 when he returned to the United States to study law.

Upon graduating from Harvard Law School in 1924 he engaged in the general practice of law in Indianapolis, his birthplace. During World War II his Army service included duties with field troops and with the OSS, and an assignment to the general staff at the Pentagon and in Europe where he served as special assistant to the Attorney General of the United States as a hearing judge on selective service matters in his federal district.

HAROLD RABLING, who for nearly three decades has been associated with Standard-Vacuum Oil Co. in Australia and New Zealand, has been elected to membership on the board of directors in New York.

Mr. Rabling has been chairman and managing director of Vacuum Oil Co., Pty., Ltd., a Stanvac subsidiary with headquarters at Melbourne, since 1945. He started his petroleum career as an engineer with that organization and advanced through various executive positions to become a director in 1938. During the next seven years, he served in Stanvac's New York office, most of this period as consultant for the company's operations in Australia, New Zealand and the South Pacific islands.

J. W. SANDBERG, formerly with the Perco division of Phillips Petroleum Co., is now refinery manager of the Lakeside Refining Co., Kalamazoo, Michigan, it is announced by L. W. Brummitt, president.

After receiving a chemical engineering degree from McGill University, Montreal, in 1940, Mr. Sandberg spent two years with North Star Oil Ltd. of Winnipeg, Canada, and six years with Trinidad Leaseholds Ltd. at Pointe-a-Pierre, Trinidad, B.W.I. in refinery operations. In August 1948, he joined the Perco division of Phillips Petroleum Co., Bartlesville, Oklahoma.

D. C. ENDOM, manager of material accounting for Sun Oil Co. at Dallas, has been appointed office manager for Sun at Calgary, Alberta, Canada. Mr. Endom was graduated *cum laude* from St. Edward's University, Austin, Texas, with a degree in business administration and has been with Sun for 18 years. He is a certified public accountant.

J. A. McQUILKIN has also been elected a director of the Standard-Vacuum Oil Co. A petroleum marketer in Southeast Asia for a quarter-century, he has been serving since 1950 at Stanvac's New York office as deputy manager and later manager for the company's Southeast Asia marketing organization.

Mr. McQuilkin entered the oil business in 1926 and was assigned a year later as a salesman in Malaya. Subsequently he served as manager of sales districts at Ipoh, Penang, Kuala Lumpur and Singapore. Appointed territory manager for Thailand in 1936, he was promoted to sales manager for the Malaya-Thailand division in 1940 with headquarters at Singapore. During World War II Mr. McQuilkin was interned at Santo Tomas prison in the Philippines for more than three years, but went back to Singapore in 1945 as general manager of Stanvac's Malaya-Thailand division.

JOHN M. GRAHAM has been appointed chief process engineer in Standard-Vacuum Oil Company's refining coordination department, having resigned his position as assistant supervising engineer in the Standard Oil Development Company's Esso engineering department to accept the Stanvac appointment.

Mr. Graham's work with the development company covered mechanical and process engineering assignments including design, planning, field work and economic studies. In the past two and half years as assistant supervising engineer of the engineering department, he has followed the work of three, and sometimes four, process engineering groups assigned to distillation, cracking, lube oil, light ends and treating projects.

R. C. JOPLING, vice president of Phillips Petroleum Co., has relinquished his former duties as head of the advertising department and will devote his entire time to representing the company in Washington, D. C. F. L. Rice remains as manager of the advertising department, and O. E. Bettis continues as advertising manager.

Myron O. Johnson has been named manager of the newly created coordination and supply department which will be responsible for the coordination and product exchange activities formerly handled by the supply and transportation department. In addition, the new department will handle the refined products and liquefied petroleum gas purchases formerly handled by the sales department. Mr. Johnson also has been appointed a member of the operating committee and of the product and process committee. John L. Kyser, coordinator, is assistant manager of the new department.

E. H. Lyon has been named assistant sales manager, and will assist the sales manager in the overall operation of the department. John Getgood, formerly assistant division manager in the Chicago division, has been promoted to regional manager succeeding Mr. Lyon, with headquarters in Bartlesville.

COURTNEY C. BROWN has been elected a director of Esso Standard Oil Co. Mr. Brown, who is assistant to the chairman and economic advisor of Standard Oil Co. (New Jersey), will continue to act in these capacities for the parent company.

HENDERSON SUPPLEE, JR., has been elected president of Atlantic Refining Co., succeeding Robert H. Colley. Mr. Colley, who has been associated with Atlantic for 33 years, was elected chairman of the board.

Mr. Supplee came to Atlantic in 1947 as vice president and general manager of domestic sales. In 1948 he was made a director and in 1949 was named executive vice president.

W. F. STROUD has been named a vice president of Atlantic and general manager of manufacturing. In this position he will be in charge of all manufacturing activities of the company and responsible for the purchase of crude oil required by the refineries to supplement Atlantic's own production.

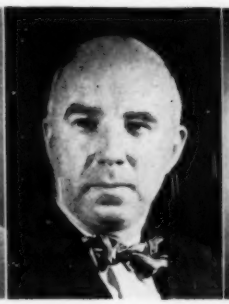
Mr. Stroud started with Atlantic in 1916. During his service he has held the position of superintendent of the gas department and also of the lubricating department in the Philadelphia refinery. He became assistant plant manager of the refinery in 1925 and manager in 1945.

He succeeds E. J. Henry, who, after 47 years of service, has withdrawn from active functional management but remains as a director.

W. Wallace

H. Rabling

J. McQuilkin



J. Graham

H. Supplee, Jr.

W. Stroud

W. H. Ritterbusch

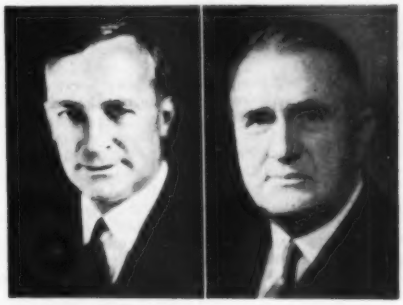
WALTER H. RITTERBUSCH has resigned as manager of the land and geological department of Kewanee Oil Co., Tulsa, Okla., to engage in exploratory activities on an independent basis. He had been with Kewanee since 1935 except for three years during World War II during which he served with the Army Air Force in the construction and operation of air bases in Latin America and later in the North Atlantic.

M. H. KEEL has been appointed manager of a newly formed advertising department in Shell Chemical Corp. Born in Lethbridge, Alberta, and a graduate of the University of Alberta and of the University of Michigan, Mr. Keel joined the advertising staff of Shell Chemical in 1948. In his new position he will direct Shell Chemical's advertising, publications and sales promotion program for agricultural chemicals, fertilizers, solvents, industrial chemicals and plastics &

HARRY T. KLEIN was elected to the newly-created post of chairman of the executive committee at the April meeting of the directors of The Texas Company. Executive vice president J. Sayles Leach was elected president of the company to succeed Col. Klein.

Col. Klein entered the service of the company in 1921 as assistant general counsel and was appointed general counsel in 1925. In 1933 he became a director and was elected vice president and general counsel. In 1940, he was made executive vice president and general counsel. He was elected president of the company in 1944 and served in that capacity up to the present time.

J. Sayles Leach joined the company in 1916 as a bookkeeper in the Dallas sales office. By 1925, he had advanced to the post of superintendent of sales of the Dallas district, and in 1927 he was appointed assistant manager of sales for the southern territory, with headquarters in Houston. In 1929, he was made manager of the southern territory, and in 1938 he became a vice president with headquarters in Houston. In 1949, Mr. Leach was elected a director and in 1950, he was named executive vice president, with headquarters in New York.



H. T. Klein *J. S. Leach*

J. S. Haskins

JAMES S. HASKINS' appointment as director of public relations of the American Oil Co. has been announced by Herschel C. Smith, president of the company. Mr. Haskins joins the American Oil Co. after 21 years of professional public relations and newspaper experience.

BEN F. HARTMAN, assistant manager of the process promotion division, Socony-Vacuum laboratories, has been named technical director for the company's Augusta, Kansas, refinery, effective June 15. Mr. Hartman will fill the position of the late Emory Skinner.

A native of Beloit, Kansas, Mr. Hartman was graduated from Kansas State College in 1930 with a B.S. in Chemical Engineering. He joined Socony-Vacuum as a chemical engineer at the Augusta refinery in June, 1937, and was transferred to the New York office in August, 1951.

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E. A. Koenig

E. A. KOENIG, general superintendent for Texas Eastern Transmission Corp., has received a leave of absence to accept a one year appointment as Chief, Gas Transmission Branch, Gas Operations Division, Petroleum Administration for Defense, in the U. S. Department of Interior at Washington, D. C. Mr. Koenig will serve in Washington without compensation and in his absence H. M. McDonald, superintendent of pipelines, will act as general superintendent.

A. H. FOX has been promoted to research associate in the automotive research division of Standard Oil Co. (Ind.) at Whiting, Ind. Mr. Fox began his work with Standard in 1937, and was advanced to group leader in 1944.

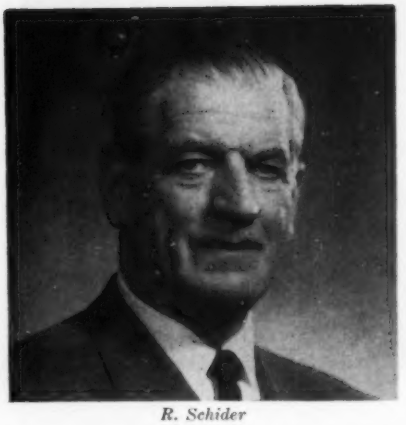
J. A. CLEVERLEY of Bartlesville has been named as manager of the production division of Cities Service Oil Co. (Del.), succeeding M. J. Kirwan, who will retire, but will continue to act in a consulting capacity. C. E. Beecher of Bartlesville, who has been general superintendent of the division, will become director of production research and development. C. R. Smith, who has been assistant division superintendent at Odessa, Texas, will be transferred to Bartlesville as general superintendent of the division.

Mr. Kirwan's retirement comes after almost 45 years in the field of oil and gas production in the United States and the Orient, starting in 1908 when he was field engineer for Associated Oil Co. In 1924, he was appointed chief petroleum engineer and manager of production for a Cities Service predecessor company. He was made general superintendent of Cities Service production division in 1941 and manager of the division in 1943.

Mr. Cleverley, the new production division manager, is a long-time Cities Service employee, entering company service in 1920 as a junior engineer. He has served in various executive capacities in the company's oil production division at Oil Hill, Madison and Russell, Kans., and Oklahoma City. He was transferred to Bartlesville in 1948 and later was appointed assistant general superintendent.

Mr. Beecher was employed by Cities Service in 1924 to do special research on the physical characteristics of crude oil. Since 1927, Mr. Beecher has served in various executive capacities in the production division. He is a newly-elected director of Cities Service Oil Co. (Del.).

C. R. Smith, who is being transferred to Bartlesville as general superintendent, is a 25-year man with Cities Service. He began as a junior engineer and served as production engineer and in other capacities at Seminole, Oklahoma City, Bartlesville, and Odessa.

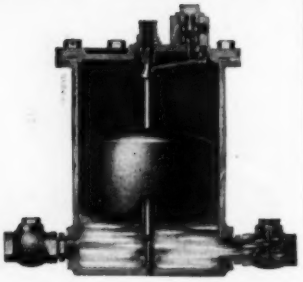


R. Schider

RUDOLPH SCHIDER has been elected a director of Mazda Oil Corp., a subsidiary of National Phoenix Industries, Inc. Mr. Schider was for 30 years a geologist and technical expert in the Royal Dutch/Shell group, being also production manager and vice president in charge of operations of the Mexican Eagle Oil Co., and special consultant of the Asiatic Petroleum Corp.

L. G. WILKE, division sales manager, Phillips Petroleum Co., Denver, Colo., has been promoted to regional manager with headquarters in Bartlesville, Okla. Mr. Wilke will have supervision of the company's Inland, Wasatch, Denver, and Wichita divisions. Floyd M. Burk, assistant division manager, Denver, will replace Mr. Wilke as division manager there.

AUTOMATIC PUMP for lifting liquids and oils



This automatic pump combines the good qualities of a pressure pump and a vacuum trap. Pumps hot condensate from low-pressure or vacuum vessels and lifts up to fifty feet or more; pumps boiling, cold or gaseous fluids (including oils); pumps petrol, benzine, dye liquors and alkaline liquors such as caustic, ammonia, etc.; drains sump holes, pits, excavations (where it may be fully submerged). Stops when there is no more liquid to pump; restarts automatically when liquid again flows into it. ***Details of the 'Ogden' Pump (in five sizes) from:***
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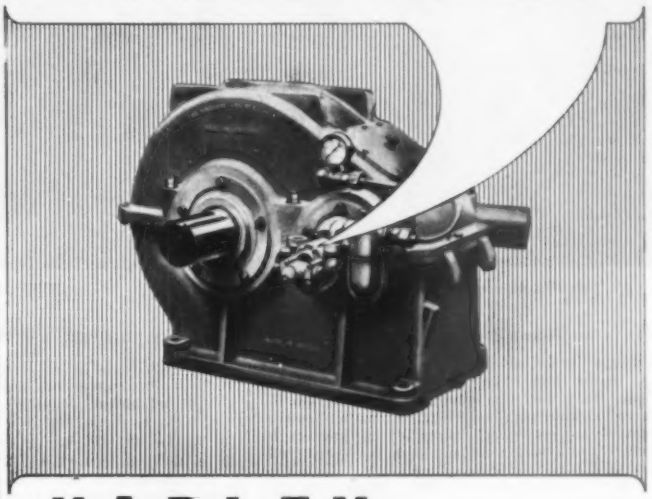

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R. W. Malone *J. A. Wilson* *E. C. Jones* *R. E. Hall* *J. C. Roberts*

Joins Hunt Tool Co.

Ralph Tarter, an expert in the field of setting up, repair and servicing of drilling rigs, has joined Hunt Tool Co. as service engineer. He will be responsible for inspecting drilling equipment, consulting concerning repairs or changes to be made in such equipment and supervising the work done in the various Hunt shops.

For 13 years prior to joining Hunt Tool Co., Mr. Tarter was employed by the National Supply Co. as service engineer, where he was in charge of setting up, repair and and servicing of drilling rigs. He was previously associated with Fairbanks Morse & Co. as a diesel service engineer.

Rheem International Appointment

Robert H. Harris has been named assistant manager of Rheem International, a division of Rheem Manufacturing Co., it was announced by A. Lightfoot Walker, vice-president in charge of Rheem International. Mr. Harris will make his headquarters in New York. Before joining Rheem, he was general sales manager of the Westinghouse Electric International Co.

Appoints Four Vice Presidents

Wyatt Metal & Boiler Works of Houston and Dallas announces the appointment of four new vice presidents; Ralph W. Malone, John A. Wilson, Ed C. Jones, and Roy E. Hall.

Ralph W. Malone, who is now general counsel for Wyatt as well as vice president, has been associated with the company since 1929, having served the original founders of the company. He resides in Dallas.

John A. Wilson, who also resides in Dallas, has served with the company since 1933. Before joining Wyatt he was with Mosher Steel Co. and the Texas highway department.

Roy E. Hall of Houston has been with the company since 1929, beginning as a machinist and draftsman. Ed C. Jones, also of Houston, has been with the company since 1923, serving originally as a field superintendent, and was later in charge of the building of the Houston shops.

Among other recent appointments is the promotion of Jack C. Roberts to assistant manager of sales. Mr. Roberts has been with the company since 1934 and now resides in Dallas.

Products Line Planned

Plans for construction of a 330-mile products line from Salt Lake City to Boise, Idaho were announced by Salt Lake Pipe Line Co., a subsidiary of Standard Oil Co. of Calif. The new line, to be built at a cost of $8 million, will parallel an existing pipe line route completed to Boise two years ago, and then extended to Pasco, Washington. Its completion will boost the pipe line company's transportation capacity along this route from 22,000 barrels to 39,500 barrels daily. With the addition of supplementary pump stations, it would be possible to raise this capacity to 45,000 barrels a day.

Cyanamid Names Product Supervisor

Dr. Nolan B. Sommer has been named supervisor of the new product development department of American Cyanamid Co. He was a research chemist in Cyanamid's Stamford laboratories from 1944 to 1947 and then became market development manager for Jefferson Chemical Co., a firm jointly owned by American Cyanamid and The Texas Co.

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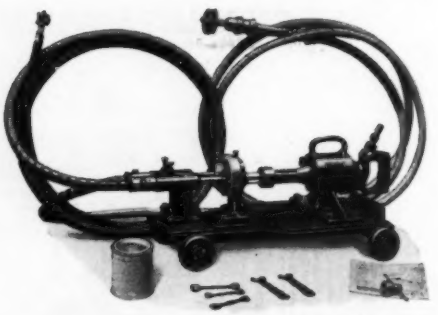

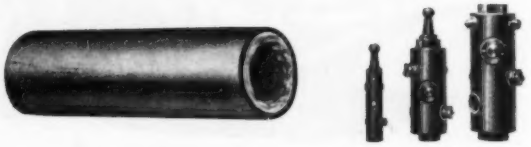

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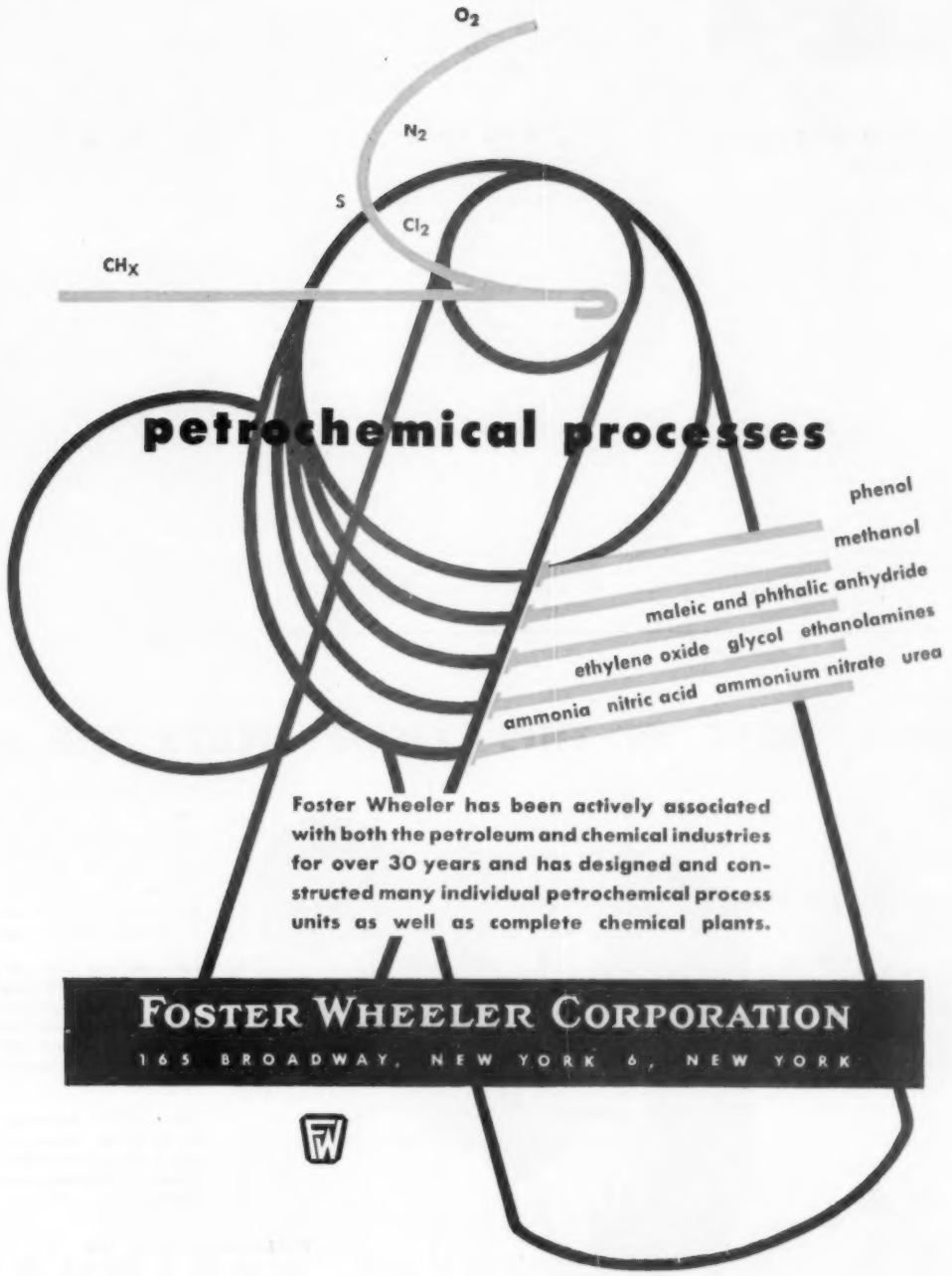
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H. L. Mumma *H. Unger*

BS & B Establishes Export Department

Henry A. Ruysser, Jr., vice president and general manager of sales, Black, Sivalls & Bryson, Inc., has announced the establishment of a new export department, and the appointment of Harlan L. Mumma as BS & B's eastern regional sales manager.

The export department, located at the Kansas City general offices, will be under the direction of Hans Unger, export manager, who has spent 27 years dealing with export sales. Mr. Mumma, manager of the company's New York office, will continue as resident export manager in addition to his new assignment.

The company has also opened a new welding shop at Odessa, Texas, to serve west Texas and eastern New Mexico. New facilities at Odessa also include a new wood shop which will be used primarily for the re-shopping and repairing of wood tanks, but will also include facilities for fabricating new tanks. A combination office-warehouse will increase storage space and consolidate all warehousing in one building. Total cost of the entire installation will be approximately $150,000.

New Davison Plant

Davison Chemical Corporation is building a $7 million catalyst plant ten miles south of Lake Charles on the Calcasieu River in Louisiana. It will go into production early next year. Supervising ground breaking for the plant's main process building are W. E. Maclean, project engineer for Davison; J. I. Crout, project manager; and Clifford Huff, field superintendent, both of Consolidated Engineering. Mr. Huff will stay with the job until its completion.

Material shortages may delay the work, but there is hope that the construction schedule can be maintained because of the high priorities given to projects essential to defense material production.

Book Review

The Petroleum Dictionary, by Lala Phipps Boone, Published 1952 by University of Oklahoma Press, Norman, Okla.; 338 pages, $5.00.

This is what might be called "An Unabridged Dictionary of the Language Spoken by Oilmen of the United States and Other Anglo-American Territories." It is a compendium of all the words and terms used by persons active in exploring for, producing, pipelining and refining petroleum, words and phrases which they use in meaningful communication with one another, but which are likely to be unintelligible to outsiders.

In years of gathering this material, the author, a specialist in philology, has accumulated more than 6,000 words and expressions that constitute the special vocabulary of oilmen from roustabout up through drillers, superintendents, scouts, geologists, geophysicists, sales managers to company presidents. All is alphabetically arranged. You can find the meaning of alkylation, anticline, auger-sinker-bar guides and allowable; or of bean back, belly buster, bit hustler, blind box, cathead, rat hold, grief stem and ragtown. This dictionary will be very useful to oilmen themselves as well as to outsiders.

Pan-Am Southern Elects Officers

Election of Gilbert C. Pearson as assistant treasurer of Pan-Am Southern Corp. was announced following a meeting of the company's directors.

Mr. Pearson, credit manager of Pan-Am for several years, was the only new officer elected in the company at the meeting. Directors re-elected include Roy J. Diwoky, executive vice president; Thomas W. Hughes, financial vice president; Robert L. Aycock, vice president; Richard T. Colquette, vice president; Milton C. Hoffman, vice president; Harry S. Read, vice president; and Sam H. Casey, D. P. Hamilton and Frank R. Lutenbacher, directors.

Mr. Pearson, who was elected to a newly created position, has been with Pan-Am since 1925. He has served as a director of the New Orleans Credit Men's Association, as well as a director of New Orleans Retail Credit Bureau and is a member of the National Association of Credit Men and the National Petroleum Credit Association.

J. W. Thomas, president (right), and William Edwards, vice president (left), of Geophysical Service, Inc. of Dallas, Tex., at New York International Airport returning from Belgium where they completed a contract with Petrofina to explore for oil in Portuguese Angola.

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FORMATION AND JOHNSTON CASING TESTING

Texas Eastern Opens New Line

Texas Eastern Transmission Corp. has begun operations of its new 30-inch pipe line as far north as the Ohio River, according to an announcement by R. H. Hargrove, president.

Construction and testing of that section of the new line which extends from Kosciusko, Mississippi to the Kentucky-Ohio crossing of the Ohio River has been completed and Texas Eastern now is delivering gas to the Appalachian area through connections with the Columbia Gas System.

The remainder of the line will be completed this summer, and when regular operations begin, plans provide for Texas Eastern to build up deliveries gradually to about 400 million cubic feet of gas per day through the new 30-inch line. Total delivery capacity of the company will then exceed 1.2 billion cubic feet of natural gas per day.

To Construct Acid Plant

Monsanto Chemical Co. is planning the construction of a 250-ton sulfuric acid plant on an 86-acre site at Avon, Calif. The plant, which will utilize waste sludge and hydrogen sulfide piped from the adjacent Tide Water Associated Oil Co. refinery, will be owned jointly by Monsanto and Tide Water. It is expected to be in operation by the end of 1952.

Basis of the new plant will be the Monsanto-Ross-Wilde process developed during World War II. By this process, it is possible to recover a very high percentage of the acid in refinery sludges in the form of a gas much higher in sulfur content than that obtainable by the burning of elemental sulfur. Acid produced is water white and indistinguishable from new acid produced from elemental sulfur.

San Juanito Changes Name

San Juanito Oil Co., according to a statement by President Robert J. Bradley, has officially changed its name to San Juan Oil Co.

San Juanito was an outgrowth of the original San Juan Oil Co. which was recently dissolved as a consequence of an exchange of stock with General American Oil Co. At that time the officers and key employees of the original company formed San Juanito. All of the original staff, including five engineers and geologists, were retained with the continuing organization.

San Juan is now identified as the operator and manager of the Mazda Oil Corp., formerly of Tulsa, Oklahoma, and Texas Consolidated Oils of Dallas, Texas. In addition, it has taken over the management and operation of a newly formed company, Oil and Gas Property Management, Inc. The latter company, formed by a New York investment group, recently filed a registration statement with the SEC for a ten million dollar capitalization, primarily for the purpose of acquiring producing properties and companies.

Creole Wins Management Award

Creole Petroleum Corp., New York, has been awarded a Certificate of Management Excellence by the American Institute of Management. It becomes one of 308 firms in the United States and Canada which have been designated "excellently managed" by the Institute.

According to Jackson Martindell, president of the management group, the awards are based on each company's achievements in ten separate fields: economic function, corporate structure, health of earnings growth, fairness to stockholders, research and development, directorate analysis, fiscal policies, production efficiency, sales vigor and executive evaluation. In order to be certified, he said, a company must receive 7,500 points out of a possible 10,000. The point system is based on a continuing corporate study of 3,000 concerns.

Blaw-Knox Expands Service

Chemical Plants Division of Blaw-Knox Co. has been licensed by the Socony-Vacuum Oil Co. to use its technical information and processes pertaining to the catalytic reforming of petroleum hydrocarbons. This agreement supplements an earlier license to Chemical Plants Division to design and build catalytic cracking plants using the Socony-Vacuum patented processes. The use of this information will enable Blaw-Knox to widen its engineering and construction services to the oil refinery and petrochemical industries.

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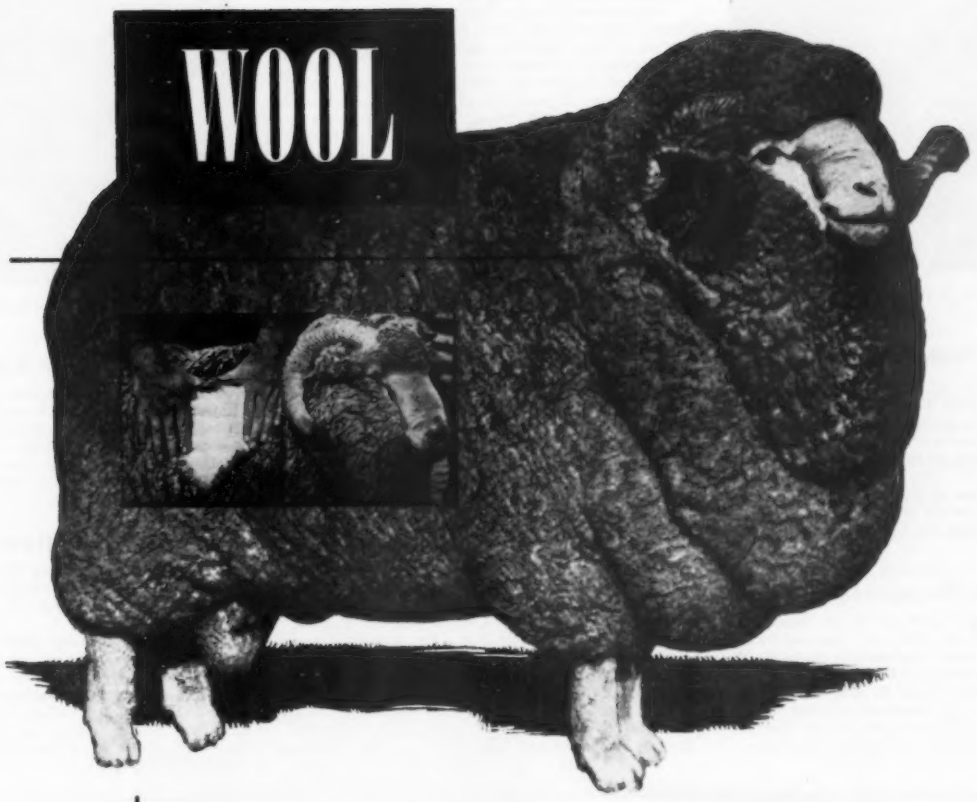

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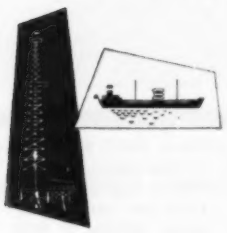

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G. J. Meyer

Appointed Hughes Ad Manager

Appointment of G. J. Meyer as advertising manager of the Hughes Tool Co. is announced by M. E. Montrose, vice president, sales. There are few men in the industry who have seen as much rock bit history made as has Mr. Meyer. When he joined Hughes 35 years ago, the company occupied a small plant at 2nd and Girard Streets, Houston. He has served in shipping and sales departments. Recently he has been assistant to the sales manager.

Southeastern Manager for OIIC

George A. Beattie, chairman of the board of Wofford Oil Co., Atlanta, has been appointed district chairman for the Southeastern district of the Oil Industry Information Committee.

Mr. Beattie succeeds Thad E. Horton, of The Texas Co., Atlanta, who resigned because of ill health. Mr. Horton will continue on the Southeastern district committee, however, as a member-

Oil Discovery in Santa Clara Valley

A major oil discovery in the Santa Clara Valley, 40 miles northwest of Los Angeles, has been confirmed by Union Oil Co. of California. The discovery well, Torrey 83, is currently pumping 18.5 gravity crude at the rate of 800 barrels a day.

Union owns 30,000 acres in fee surrounding its new Ventura County well. Immediate development of its holdings has been started.

Originally planned to be drilled a maximum 7,500 feet to test the Eocene, the well was taken deeper when it encountered more Sespe oil sand than had been anticipated. At 9,327 feet, the bit was still in the Sespe. Because of the rig's limited capacity, Union stopped drilling at that point to test the 1,600 feet of Sespe sand already disclosed by core and log.

Following a short swabbing period, it became evident that there was insufficient gas volume to cause the well to flow at capacity and operations were begun to place the well on the pump. While this work was in progress, crude oil started flowing through the casing at a rate of 30 barrels an hour. The equipment was installed, however and the well is currently pumping and agitating 800 barrels a day.

The company is preparing a location for Torrey 84, an offset, 660 feet northeast of the discovery well. Simultaneously, preparations are being made to drill Simi 17, a "step out" well, approximately 2½ miles to the southeast.

Houdry Appointments

A. Wesley Hoge is now in charge of process design and David B. Ardern in charge of technical service for Houdry Process Corp. Joining Houdry in 1943, Mr. Hoge has served in the technical service division supervising initial operation of newly-licensed commercial units and the continuous plant surveys and direct assistance which Houdry affords its licensees. Mr. Ardern joined Houdry in 1942 and has been primarily engaged in process design, concentrating on the commercial design of Houdriflow moving-bed catalytic cracking units and more recent Houdriforming units for catalytic reforming of petroleum naphthas to aromatics and high octane gasolines.

J. M. Bridges

Joins Cardwell Export Office

The Cardwell Manufacturing Co., Inc., Wichita, Kansas, has appointed James M. Bridges as its South American representative. He joined the company in February after 12 years with The Buda Co. Recently he has been manager of Buda's export oil field division and eastern domestic representative.

Book Review

Methods of Analysis of Fuels and Oils, by J. R. Campbell; edited by William Gibb; published by Chemical Publishing Co., New York; 216 pages, $4.00.

This is a laboratory guide to the principal methods of examination of gaseous solid and liquid fuels and lubricating oils, primarily for students of applied chemistry, metallurgy and engineering. Brief resumes of the theoretical principles underlying the methods have been included in a number of instances.

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W. Weinrich

Process Manager for Catalytic Construction

Whitney Weinrich has been appointed manager of the process engineering section of Catalytic Construction Co. of Philadelphia and will direct all research and development, pilot plant investigation and process design for the oil refinery, chemical, and atomic energy projects of the company. Approximately 35 chemists and chemical engineers will be under his general supervision.

Mr. Weinrich has been identified with process development for 20 years. He was associated with the Gulf Research and Development Co. for 10 years in research and development, pilot plant operation, process design, and economic studies. He served as process engineer for a brief period with the Petroleum Administration for War and then joined Phillips Petroleum Co. in the pilot plant section of the chemical engineering division.

Mr. Weinrich joined Houdry Process Corp. in Marcus Hook in 1947 as head of the chemical engineering section of the development division. In 1950 he moved over to Catalytic Construction Co. to direct the process development for a uranium ore refinery under Catalytic's contract with the Atomic Energy Commission. He is the holder of 15 issued patents with more pending in the field of hydrocarbon processing and chemical synthesis.

Catalytic also announces that Don L. Horridge has become associated with the company in its Philadelphia office as manager of the planning department. Mr. Horridge, until recently, was vice president of Tears Engineers of Dallas, Texas and previously was chief draftsman for Process Engineers Inc. of Dallas and the Gasoline Plant Construction Corp. of Corpus Christi.

Houdry Process Appointments

Houdry Process Corp. has announced the appointment of Robert M. Cornforth as director of foreign sales and of the Houdry Process division of World Commerce Corp., of Rophie E. Bland as manager of domestic sales, and of George F. Hornaday as sales engineer.

Mr. Cornforth joined Houdry as a sales engineer in 1945 and was named manager of sales in 1948. He entered the petroleum industry in 1937 as a chemical engineer with Standard Oil Co. of Ind. During World War II, he was assigned by the U. S. Army Corps of Engineers to the Petroleum Administration for War and also served as executive secretary of the government's Aviation Gasoline Advisory Committee.

Mr. Bland joined Houdry in 1933 as a development engineer and has served in various capacities in both the development and engineering divisions. He has written numerous articles on catalytic processing and holds several patents in his field.

Mr. Hornaday became a member of the Houdry organization in 1940. He has held various administrative positions in the research and development division of Houdry laboratories and in the engineering division.

L. A. Dixon

Two Rockwell Men Advance

W. F. Rockwell, Jr., president of Rockwell Manufacturing Co., has announced the election of L. A. Dixon and Jas. E. Ashman as executive vice presidents.

Mr. Dixon started at the Pittsburgh Equitable Meter Co., now a division of Rockwell Manufacturing Co., in 1926, as assistant to the president. Later, he was president of the Pittsburgh-DuBois Co., manufacturers and distributors of gas meters. When that company was acquired by Rockwell, he continued to serve in the same capacity until he relinquished that position to accept the vice-presidency of the company's meter and valve divisions.

Mr. Ashman joined Rockwell in January 1947 as controller and later held both this position and that of vice president. He was formerly director of procedures for the United States Steel Corp. in Pittsburgh. As executive vice president, he will be in charge of the power tool and Rockwell Register divisions of the company.

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Legatski Receives Hanlon Award At NGAA Convention

The Hanlon award, highest honor in the natural gasoline industry and one of the ranking awards in the entire petroleum field, has been conferred on Theodore William Legatski, assistant director of research, Phillips Petroleum Co. The ceremony took place at the annual convention of the National Gasoline Association of America held in Houston.

Legatski is the 16th Hanlon award winner, and the fourth member of the Phillips organization to be so honored. The award is conferred each year by the NGAA for outstanding service to the natural gasoline and cycling industries. The donor is E. I. Hanlon, of Tulsa. Previous Phillips winners are R. C. Alden (1937), chairman research planning board; G. G. Oberfell (1939), retired, former vice president research and development; and F. E. Rice (1949), retired, former vice president natural gasoline and gas.

The presentation was made by John Lynch, president of NGAA and president of the LaGloria Corp. The official presentation of the award cited Legatski "for his over 25 years of productive research effort and guidance in the field of the light hydrocarbons, the results of which have served to strengthen and extend the outlets for the products of the natural gasoline industry; for his many contributions to the better understanding of the relationships existing between fuel composition and engine behavior; for his contributions in the field of aviation gasoline manufacture which so greatly increased our productivity in wartime; for his valuable services as a technical liaison between the petroleum industry as a whole and the automotive industry; and for his abiding faith in the future of the natural gasoline industry."

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Company Changes Name

Warren & Bradshaw Drilling Co. has changed its corporate name to Warren-Bradshaw Exploration Co., effective May 15, 1952.

The company was incorporated in 1936 and has grown to be one of the larger drilling concerns in the industry. It operates in all states in the Mid-Continent area. In 1942 it entered the producing branch of the business by the acquisition of oil properties in Texas and Oklahoma. The present plans are to expand both its drilling and exploration departments.

R. B. Warren, Jr., president of the company, has announced two promotions and one addition to the firm's personnel. Oadus White, formerly division drilling superintendent with headquarters in Oklahoma City, is promoted to drilling superintendent with headquarters in Tulsa, Oklahoma. King H. Reed, formerly production foreman of the West Texas-New Mexico district with headquarters in Odessa, Texas, has been promoted to production superintendent with headquarters in Tulsa. LeRoy F. Stewart, geologist, formerly of Fort Worth, Texas, will head the newly formed exploration department with headquarters in Tulsa.

Timken Makes Appointment

The Timken Roller Bearing Co. has announced the appointment of John F. Byrom as sales engineer, railway division, at its Minneapolis, Minnesota, office.

Mr. Byrom, a 1949 mechanical engineering graduate of Pennsylvania State College, has previously served in the same capacity at the Timken office in Chicago.

All railway division activities in both the Chicago and Minneapolis territories remain under the supervision of Paul N. Wilson, district manager, railway division.

Benedict Saurino

Benedict Saurino, head of the statistical research department of Sun Oil Co., died on May 9 in a Philadelphia hospital at the age of 47. He joined the company in 1936 as a statistical economist and had occupied his latest position since 1944.

Mr. Saurino was recognized in the petroleum industry as the leading statistical authority on tankers and his reports on this subject attracted wide attention. As consultant to the Petroleum Administration for Defense, much of his time in recent months had been spent in Washington working with other specialists in oil transportation.

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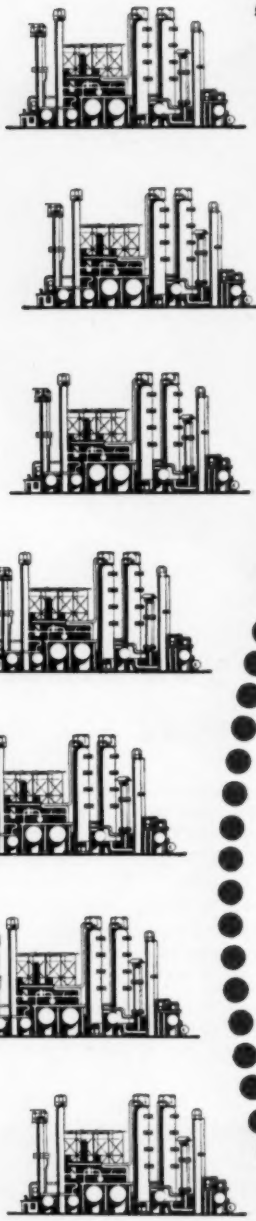

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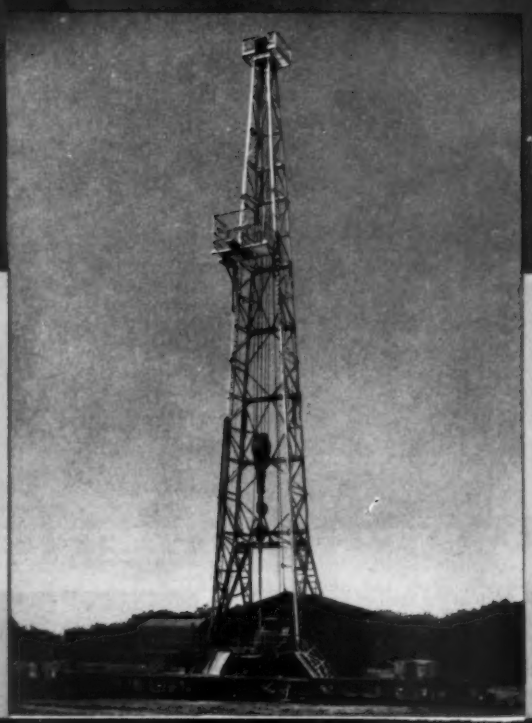

Chances are there is a standard Lee C. Moore Mast or Derrick to meet your drilling requirements. However, when specially designed structures are required consult a Lee C. Moore representative for fast, progressive engineering service.

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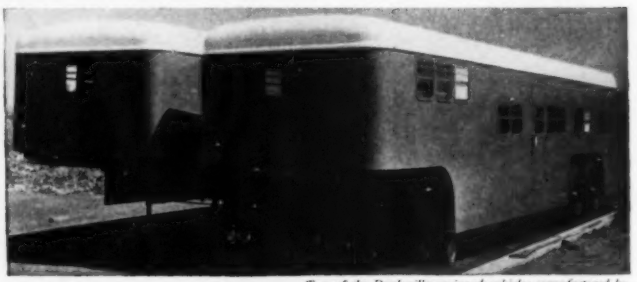
DUNLOPILLO COMFORT

IN THE SHAIKHDOM OF KUWAIT!

Employees of the Kuwait Oil Company now enjoy the cool comfort of Dunlopillo cushioning during their home-to-work journeys.



Two of the Dunlopillo-equipped vehicles manufactured by R. A. Dyson & Co. Ltd., London, with body-work by Express Motor and Bodyworks Ltd., London.

The Kuwait Oil Company Ltd. which operates in the Shaikhdom of Kuwait at the head of the Persian Gulf, has taken delivery of a fleet of eight 80-passenger semi-trailers equipped throughout with Dunlopillo. These enormous vehicles are used for the transport of employees from their residential areas to the oil-field and to the storage, export and refining installations on the coast. In the fiercely hot Persian Gulf climate only self-ventilating Dunlopillo could provide the refreshing coolness and resilient travel-comfort now so much appreciated by Kuwait employees.

For mattresses, chair cushions and vehicle seating, no other cushioning material can match Dunlopillo for exceptional comfort, long-life economy, and suitability to all climatic conditions.

The Dunlopillo seating in these huge semi-trailers was supplied by Latex Upholstery Ltd., London.

DUNLOPILLO

Dunlop Rubber Co. Ltd., (Dunlopillo Division), Walton, Liverpool, 9, England. Associated Companies and Distributors throughout the World.

2D/015

STEELS

FOR THE PETROLEUM INDUSTRY

THE UNITED STEEL COMPANIES LTD

This organisation has made a special study of steel requirements of the petroleum industry: plates for fusion welded vessels; constructional steel; forgings; alloy steels, including corrosion and heat-resisting types; etc. The Technical Departments will be pleased to discuss specific applications with manufacturers of petroleum equipment.

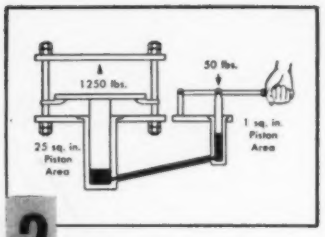
THE UNITED STEEL COMPANIES LIMITED OF SHEFFIELD ENGLAND

THE LARGEST STEEL PRODUCERS IN THE BRITISH COMMONWEALTH

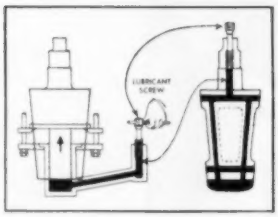
Ⓡ US 36

Here's Why AUDCO-NORDSTROM Valves Close So Tight, Yet Operate So Easily

1 Audco-Nordstrom valves use the basic scientific principle known as Pascal's law, which says that "pressure applied to a confined fluid is transmitted uniformly to all areas of the confining surfaces."

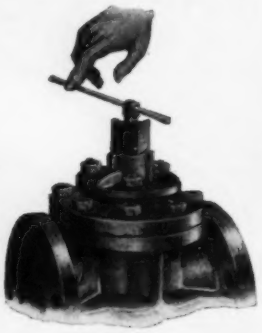


2 Here's an example showing how 50 pounds pressure on 1 square inch is sufficient to lift 1250 pounds when transmitted to a piston of 25 square inches.



3 In Audco-Nordstrom valves, the lubricant screw applies the pressure to force lubricant through the grooves of the plug and give a powerful jacking action to lift the plug off the seat and keep the valve easy to turn at all times.

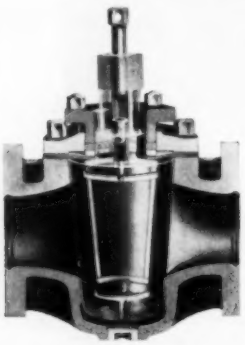
4 The grooves in the plug and body also distribute a film of lubricant across the seating surface, further sealing the valve ports against leakage, even in services where the line is carrying hard-to-hold fluids, vapors and gases.



5 A turn of the lubricant screw is all that is needed to renew the seat seal and to free the plug for easy operation.

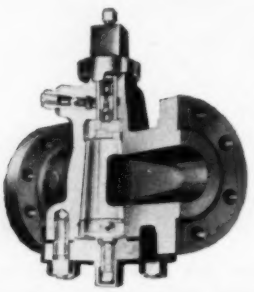
6 It takes only a quarter-turn of the plug of an Audco-Nordstrom valve to change it from fully open position to completely closed—one-tenth the time it takes to operate many valves.

7



There is a size and type of Audco-Nordstrom valves for nearly every service. Here's one with flanged ends and bolted gland. Screwed end or screwed gland patterns are also available.

8



This is the Hypreseal type of Audco-Nordstrom valve for higher pressure services. Audco-Nordstrom valves are also built with gear or power operation. Available in rectangular or full round opening. There are proper lubricants for almost every service, too.

Consult your representative

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LUBRICANT SEALED VALVES

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HUDSON presents the

Combin-aire*

A New Type Cooling System Integrated for All Process Plant Cooling Services, Combining the Economical Maximum Use of Air With Minimum Use of Water.

In the COMBIN-AIRE the use of air for cooling is extended to include low temperature cooling services previously necessitating water cooling because of high ambient air temperature. The COMBIN-AIRE allows the use of air-cooling for total heat dissipation in all services.

The COMBIN-AIRE is a combination of a HUDSON water cooling tower with HUDSON air-cooled exchangers housed in one integrated structure. During periods of high ambient temperature the inlet air is first drawn through water at the bottom of the cooling tower, reducing the air to near wet bulb temperature, at which temperature it contacts the air-cooled exchangers. During periods of low ambient temperature the inlet air is used directly in the air-cooled exchangers and no water is evaporated in the cooling tower.

When water in good quantity and quality is not available the COMBIN-AIRE has manifest advantages over any alternative combination of cooling equipment.

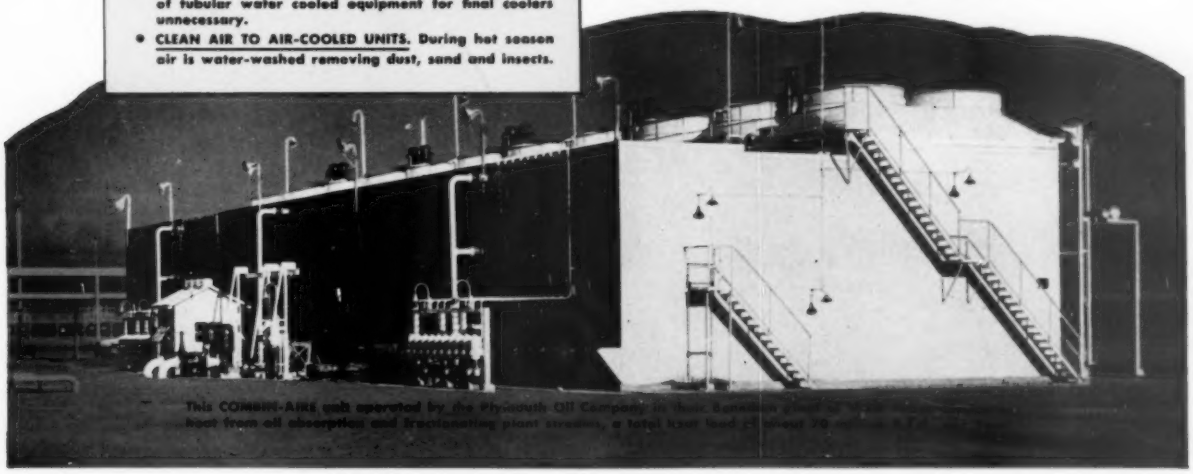
Even when ample water is available and water treatment costs are low, comprehensive comparisons will frequently indicate overall advantages of the COMBIN-AIRE system.

*** The COMBIN-AIRE unit is protected by United States patents**

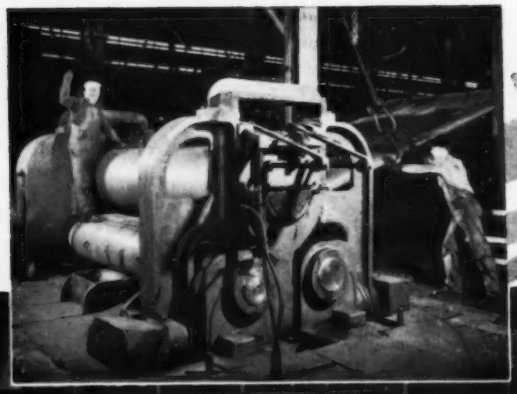
COMBIN-AIRE ADVANTAGES

- **LOW WATER CONSUMPTION.** No water is used during cold weather.
- **NO TREATMENT NECESSARY** for cooling tower water.
- **NO WATER LOSS** as spray or mechanical carryover.
- **NO CONDENSATION** from effluent air.
- **MINIMUM PIPING.** COMBIN-AIRE may be installed immediately adjacent to other process equipment. Use of tubular water cooled equipment for final coolers unnecessary.
- **CLEAN AIR TO AIR-COOLED UNITS.** During hot season air is water-washed removing dust, sand and insects.

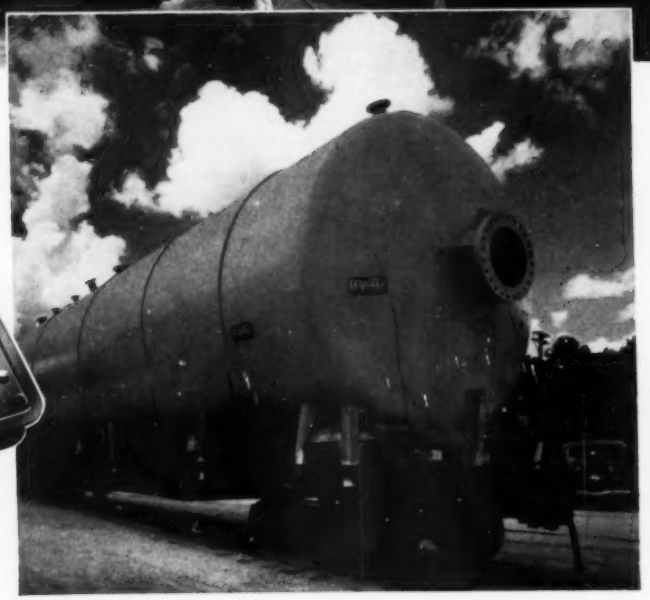
HUDSON
ENGINEERING CORPORATION
FAIRVIEW STATION • HOUSTON, TEXAS



This COMBIN-AIRE unit operated by the Plymouth Oil Company in their Sunniland plant at Sunniland, Florida, removes heat from oil absorption and fractionating plant streams, a total heat load of about 70 million B.T.U. per hour.



BIRTH OF A 150-TON STEEL BABY



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